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Kawano et al.

(10) **Patent No.: US 11,107,469 B2**
(45) **Date of Patent: Aug. 31, 2021**

(54) **INFORMATION PROCESSING APPARATUS AND INFORMATION PROCESSING METHOD**

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(73) Assignee: **SONY CORPORATION**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 111 days.

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(51) **Int. Cl.**
G10L 15/22 (2006.01)
G10L 15/26 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***G10L 15/22*** (2013.01); ***G06F 3/167*** (2013.01); ***G10L 15/26*** (2013.01); ***G10L 15/30*** (2013.01); *G10L 2015/223* (2013.01)

(58) **Field of Classification Search**
CPC G10L 15/22; G10L 2015/223; G10L 2015/225; G10L 15/26; G10L 15/30;
(Continued)

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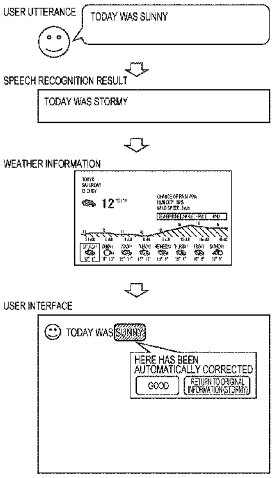
(74) *Attorney, Agent, or Firm* — Chip Law Group

(57) **ABSTRACT**

The present disclosure relates to an information processing apparatus and an information processing method for enabling provision of a more convenient speech recognition service. The information processing apparatus includes a speech recognition unit that performs speech recognition for speech information based on an utterance of a user, and a correction portion estimation unit that collates content of a sentence obtained as a speech recognition result with collation information necessary for determining accuracy of the content to estimate, for the sentence, a correction portion that requires correction. The sentence obtained as a speech recognition result is displayed together with the correction portion estimated by the correction portion estimation unit and presented to the user.

8 Claims, 22 Drawing Sheets



(51) **Int. Cl.**

G10L 15/30	(2013.01)
G10L 15/24	(2013.01)
G06F 3/16	(2006.01)

(58) **Field of Classification Search**

CPC G10L 15/00; G10L 15/01; G10L 15/02; G10L 15/10; G10L 15/32; G10L 15/20; G10L 21/00; G10L 21/028; G10L 2015/221; G10L 2015/227; G06F 3/167; G06F 3/16

USPC 704/235, 233, 246–250, 270.1, 272

See application file for complete search history.

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JP	2013-073240	A		4/2013		
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FIG. 1

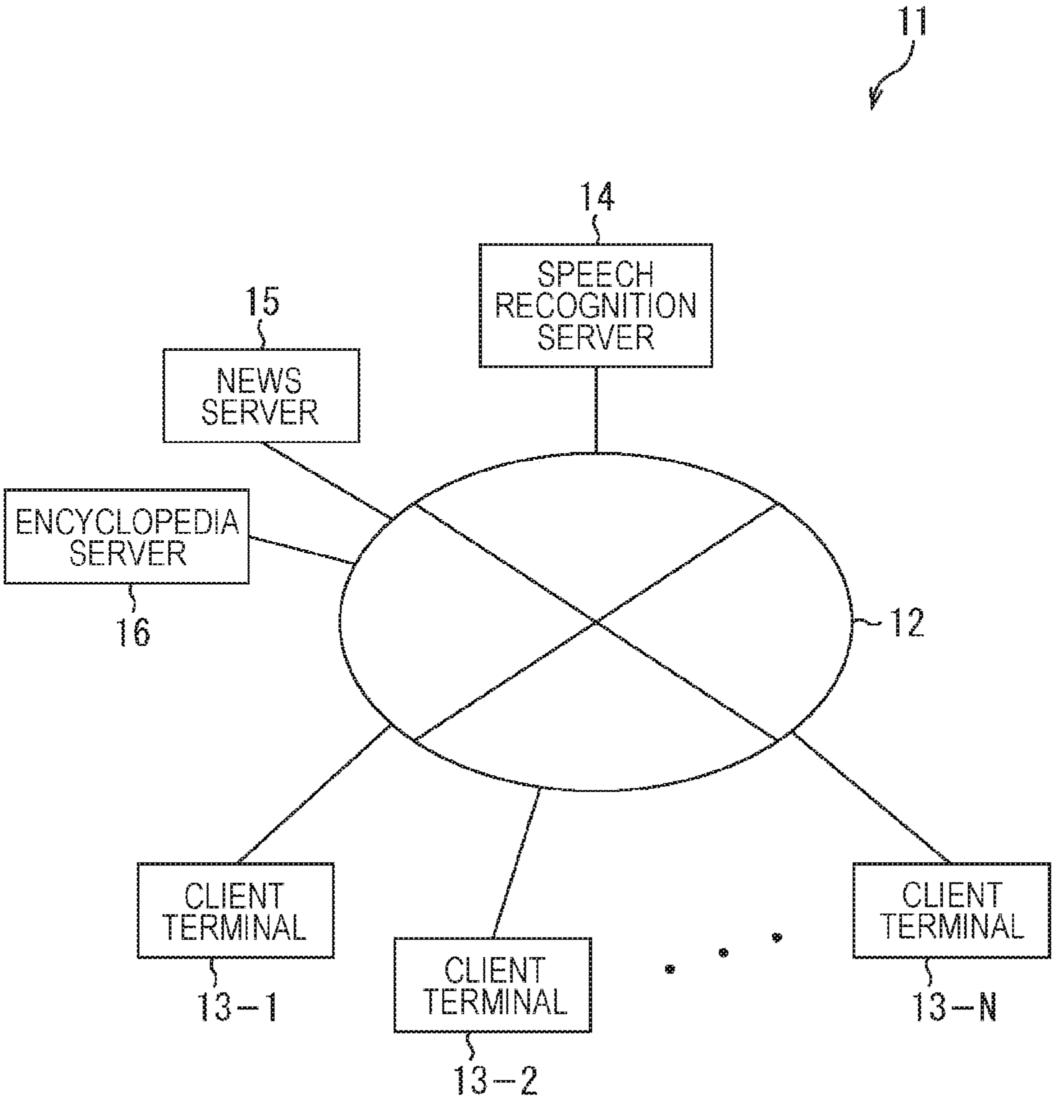

11
14
SPEECH RECOGNITION SERVER
15
NEWS SERVER
ENCYCLOPEDIA SERVER
16
12
CLIENT TERMINAL
13-1
CLIENT TERMINAL
13-2
CLIENT TERMINAL
13-N

FIG. 2

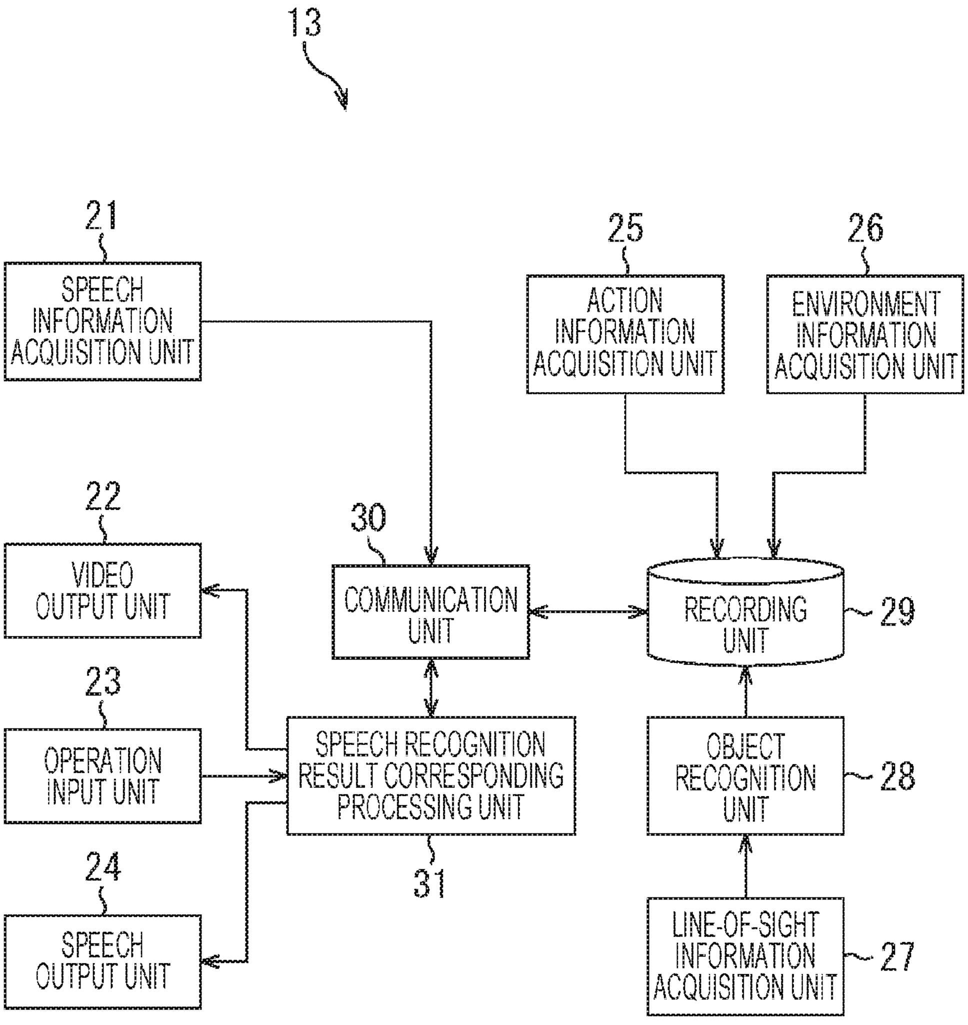

13
21
SPEECH INFORMATION ACQUISITION UNIT
25
ACTION INFORMATION ACQUISITION UNIT
26
ENVIRONMENT INFORMATION ACQUISITION UNIT
22
VIDEO OUTPUT UNIT
30
COMMUNICATION UNIT
RECORDING UNIT
29
23
OPERATION INPUT UNIT
SPEECH RECOGNITION RESULT CORRESPONDING PROCESSING UNIT
31
OBJECT RECOGNITION UNIT
28
24
SPEECH OUTPUT UNIT
LINE-OF-SIGHT INFORMATION ACQUISITION UNIT
27

FIG. 3

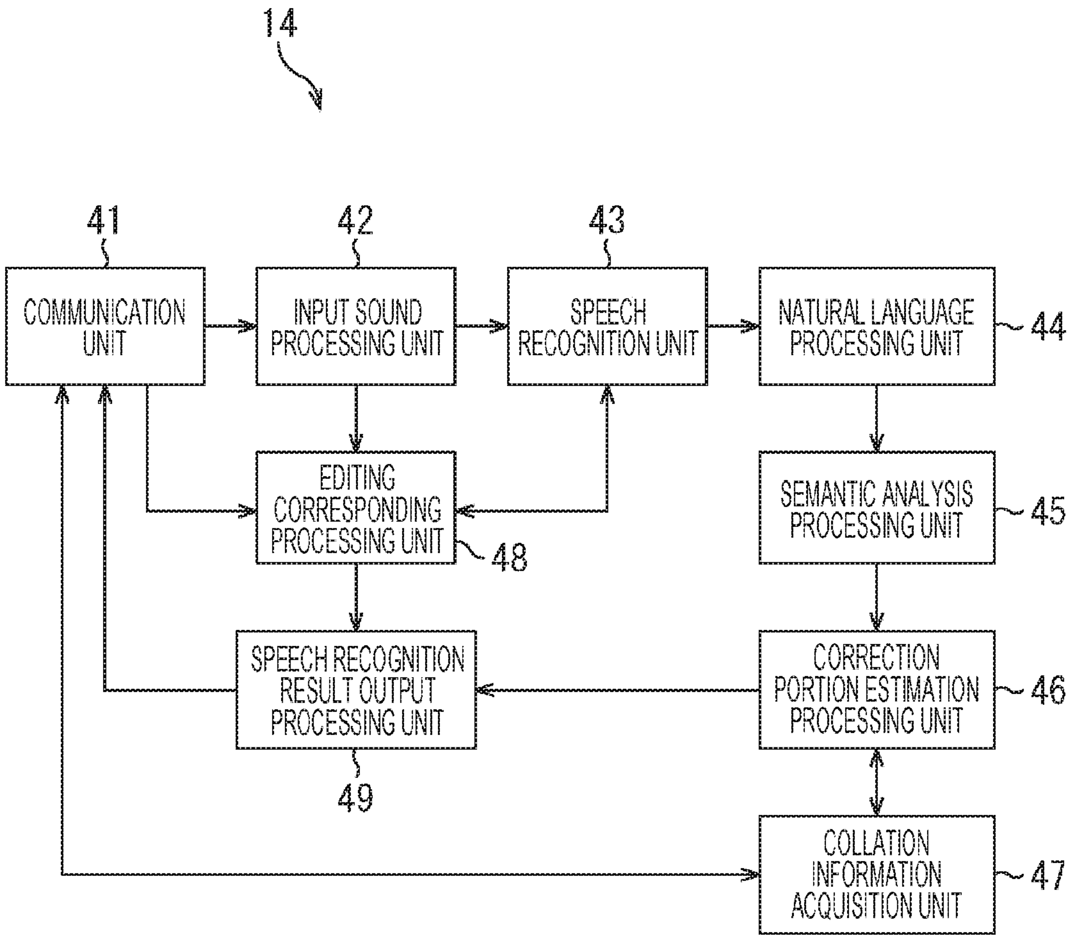
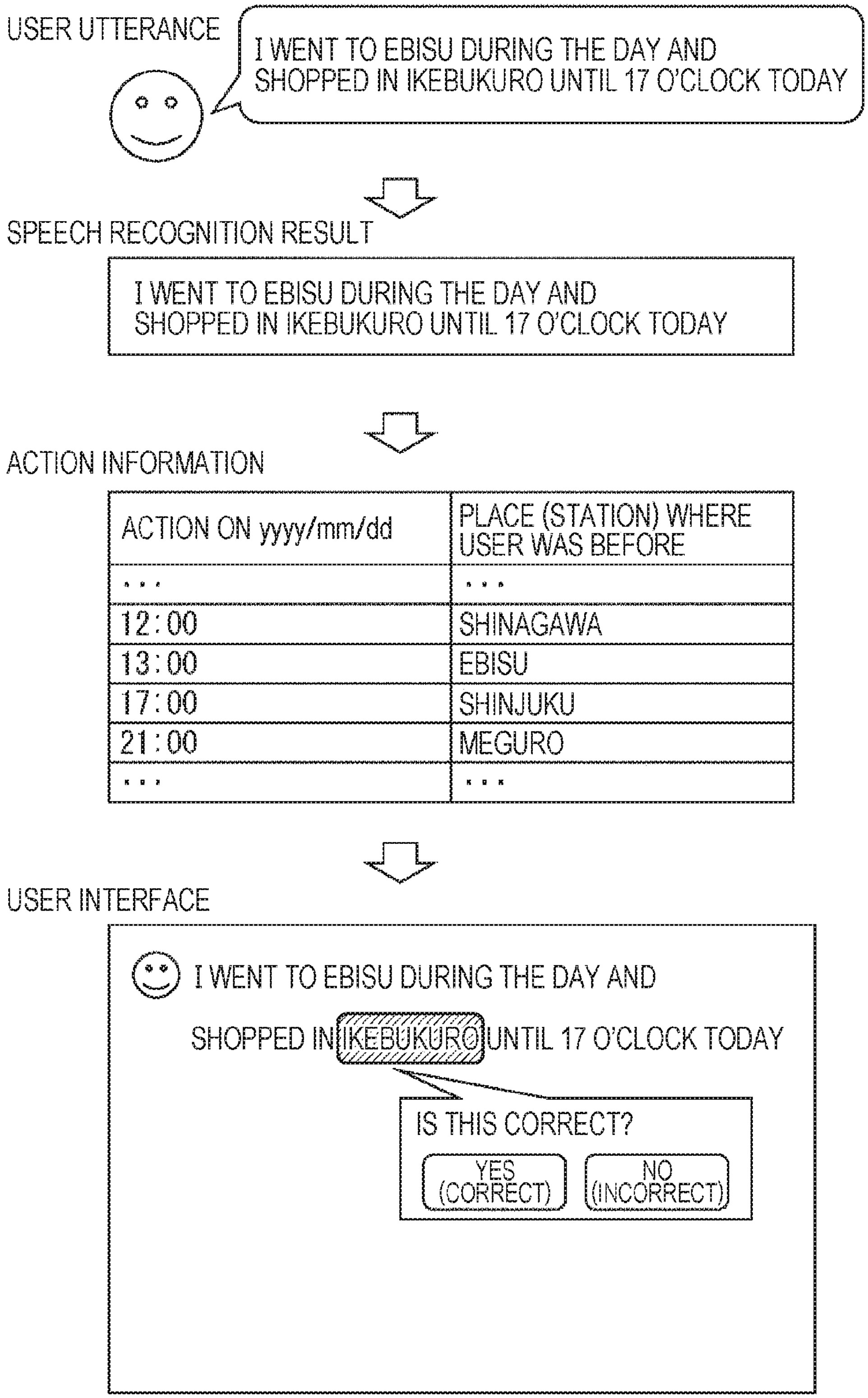

14
41
42
43
COMMUNICATION UNIT
INPUT SOUND PROCESSING UNIT
SPEECH RECOGNITION UNIT
NATURAL LANGUAGE PROCESSING UNIT
44
EDITING CORRESPONDING PROCESSING UNIT
48
SEMANTIC ANALYSIS PROCESSING UNIT
45
SPEECH RECOGNITION RESULT OUTPUT PROCESSING UNIT
49
CORRECTION PORTION ESTIMATION PROCESSING UNIT
46
COLLATION INFORMATION ACQUISITION UNIT
47

FIG. 4



I WENT TO EBISU DURING THE DAY AND SHOPPED IN IKEBUKURO UNTIL 17 O'CLOCK TODAY

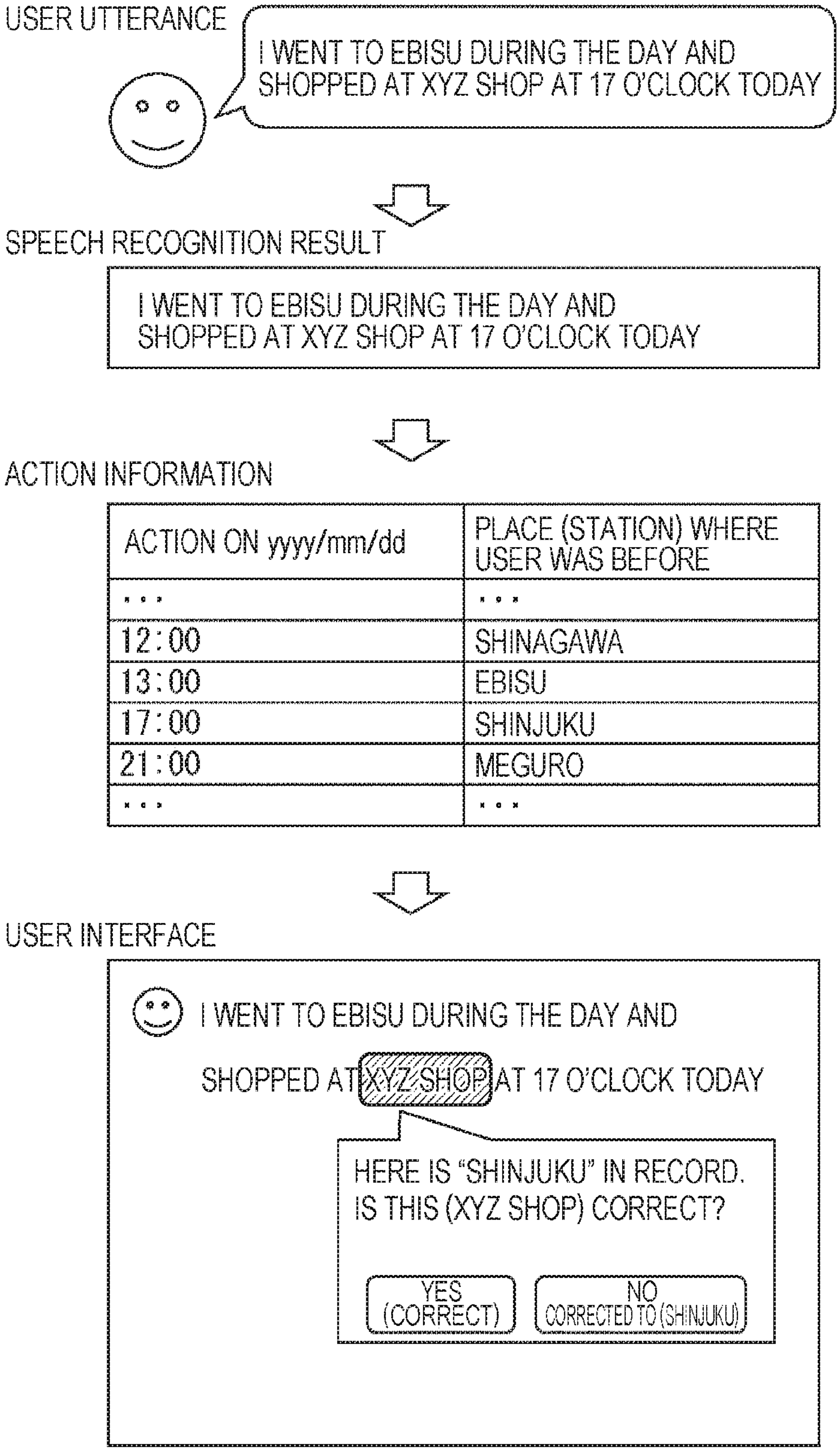
I WENT TO EBISU DURING THE DAY AND SHOPPED IN IKEBUKURO UNTIL 17 O'CLOCK TODAY

ACTION ON yyyy/mm/dd	PLACE (STATION) WHERE USER WAS BEFORE
...	...
12:00	SHINAGAWA
13:00	EBISU
17:00	SHINJUKU
21:00	MEGURO
...	...

I WENT TO EBISU DURING THE DAY AND SHOPPED IN IKEBUKURO UNTIL 17 O'CLOCK TODAY

IS THIS CORRECT?

FIG. 5



I WENT TO EBISU DURING THE DAY AND SHOPPED AT XYZ SHOP AT 17 O'CLOCK TODAY

I WENT TO EBISU DURING THE DAY AND SHOPPED AT XYZ SHOP AT 17 O'CLOCK TODAY

ACTION ON yyyy/mm/dd	PLACE (STATION) WHERE USER WAS BEFORE
...	...
12:00	SHINAGAWA
13:00	EBISU
17:00	SHINJUKU
21:00	MEGURO
...	...

I WENT TO EBISU DURING THE DAY AND SHOPPED AT XYZ SHOP AT 17 O'CLOCK TODAY

HERE IS "SHINJUKU" IN RECORD.
IS THIS (XYZ SHOP) CORRECT?

FIG. 6

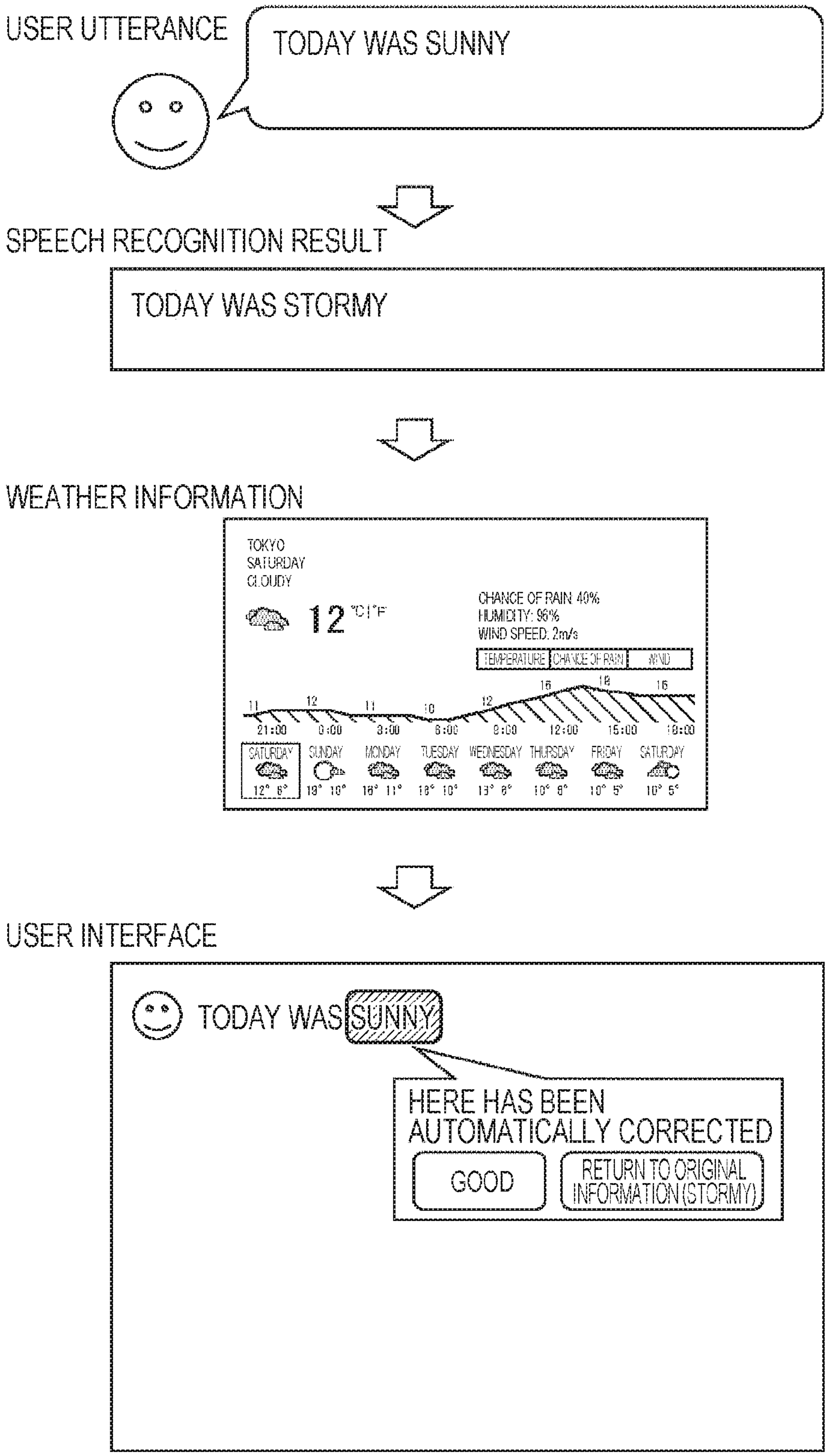

USER UTTERANCE
TODAY WAS SUNNY
SPEECH RECOGNITION RESULT
TODAY WAS STORMY
WEATHER INFORMATION
TOKYO
SATURDAY
CLOUDY
12 °C | °F
CHANCE OF RAIN: 40%
HUMIDITY: 96%
WIND SPEED: 2m/s
TEMPERATURE
CHANCE OF RAIN
WIND
11 12 11 10 12 16 18 16
21:00 0:00 3:00 6:00 9:00 12:00 15:00 18:00
SATURDAY 12° 8°
SUNDAY 18° 10°
MONDAY 16° 11°
TUESDAY 16° 10°
WEDNESDAY 13° 8°
THURSDAY 10° 8°
FRIDAY 10° 5°
SATURDAY 10° 5°
USER INTERFACE
TODAY WAS SUNNY
HERE HAS BEEN AUTOMATICALLY CORRECTED
GOOD
RETURN TO ORIGINAL INFORMATION (STORMY)

FIG. 7

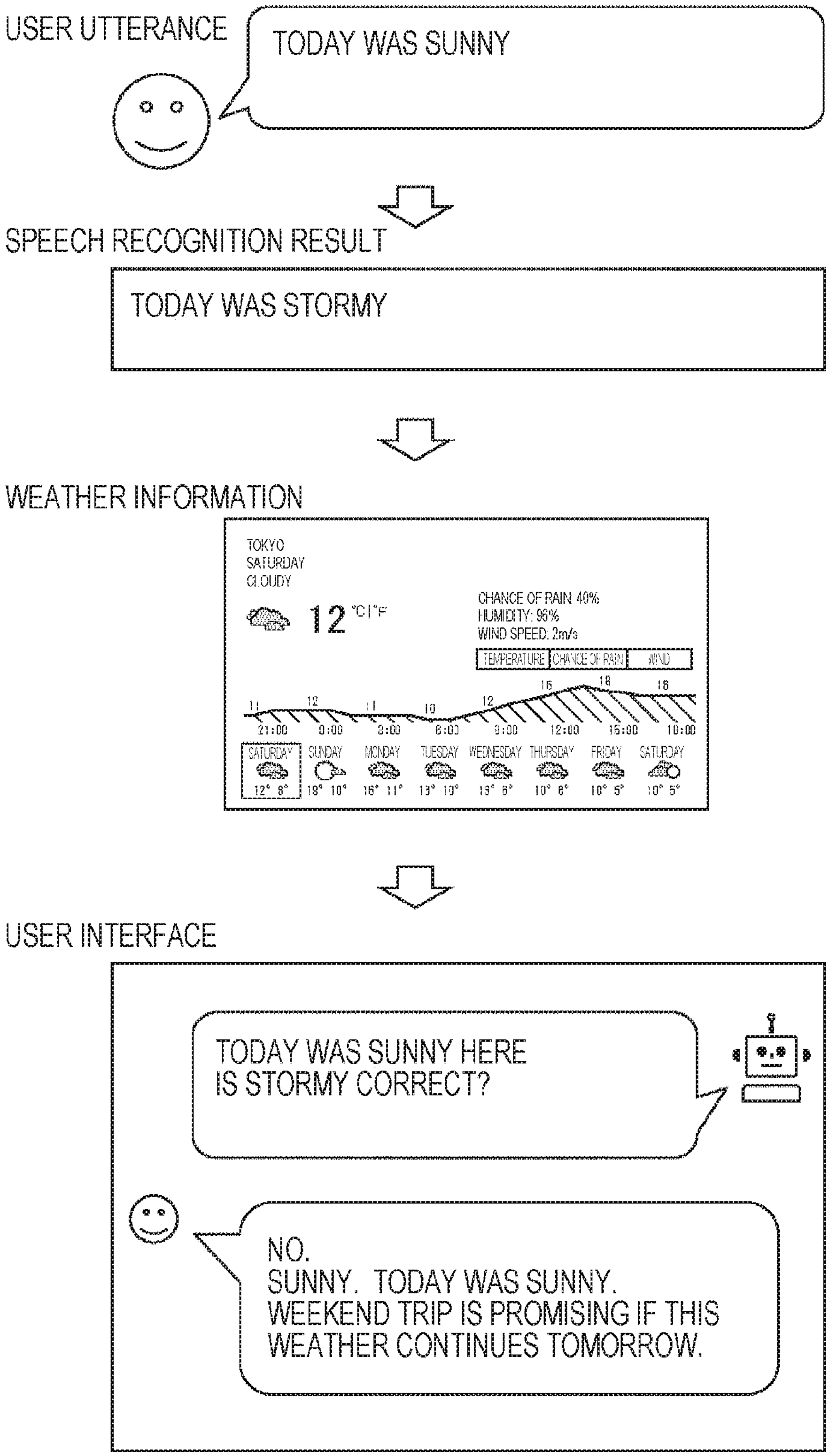

USER UTTERANCE
TODAY WAS SUNNY
SPEECH RECOGNITION RESULT
TODAY WAS STORMY
WEATHER INFORMATION
TOKYO
SATURDAY
CLOUDY
12 °C | °F
CHANCE OF RAIN 40%
HUMIDITY: 96%
WIND SPEED: 2m/s
TEMPERATURE
CHANCE OF RAIN
WIND
11
12
11
10
12
16
18
18
21:00
0:00
3:00
6:00
9:00
12:00
15:00
18:00
SATURDAY 12° 8°
SUNDAY 18° 10°
MONDAY 16° 11°
TUESDAY 13° 10°
WEDNESDAY 13° 8°
THURSDAY 10° 8°
FRIDAY 10° 5°
SATURDAY 10° 5°
USER INTERFACE
TODAY WAS SUNNY HERE IS STORMY CORRECT?
NO. SUNNY. TODAY WAS SUNNY. WEEKEND TRIP IS PROMISING IF THIS WEATHER CONTINUES TOMORROW.

FIG. 8

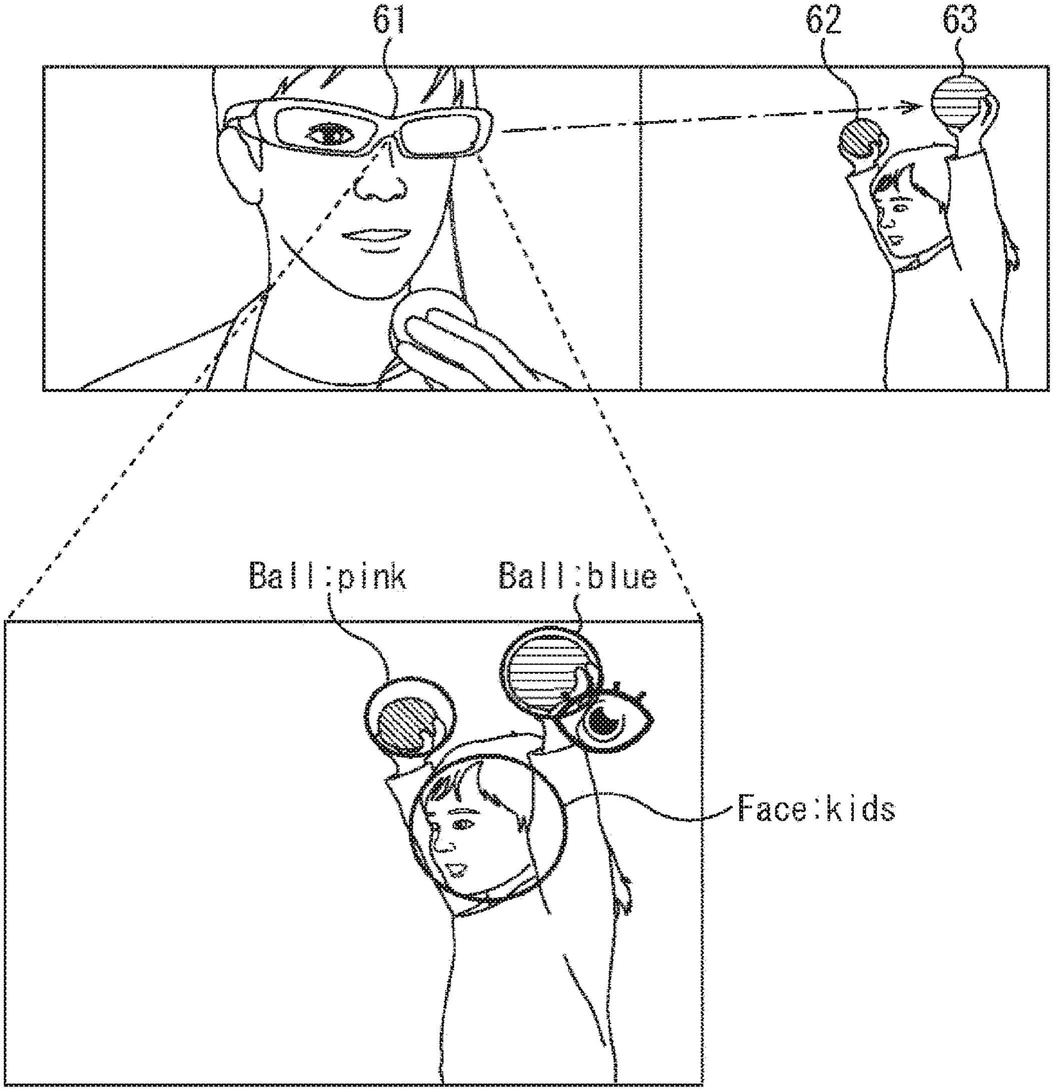


FIG. 9

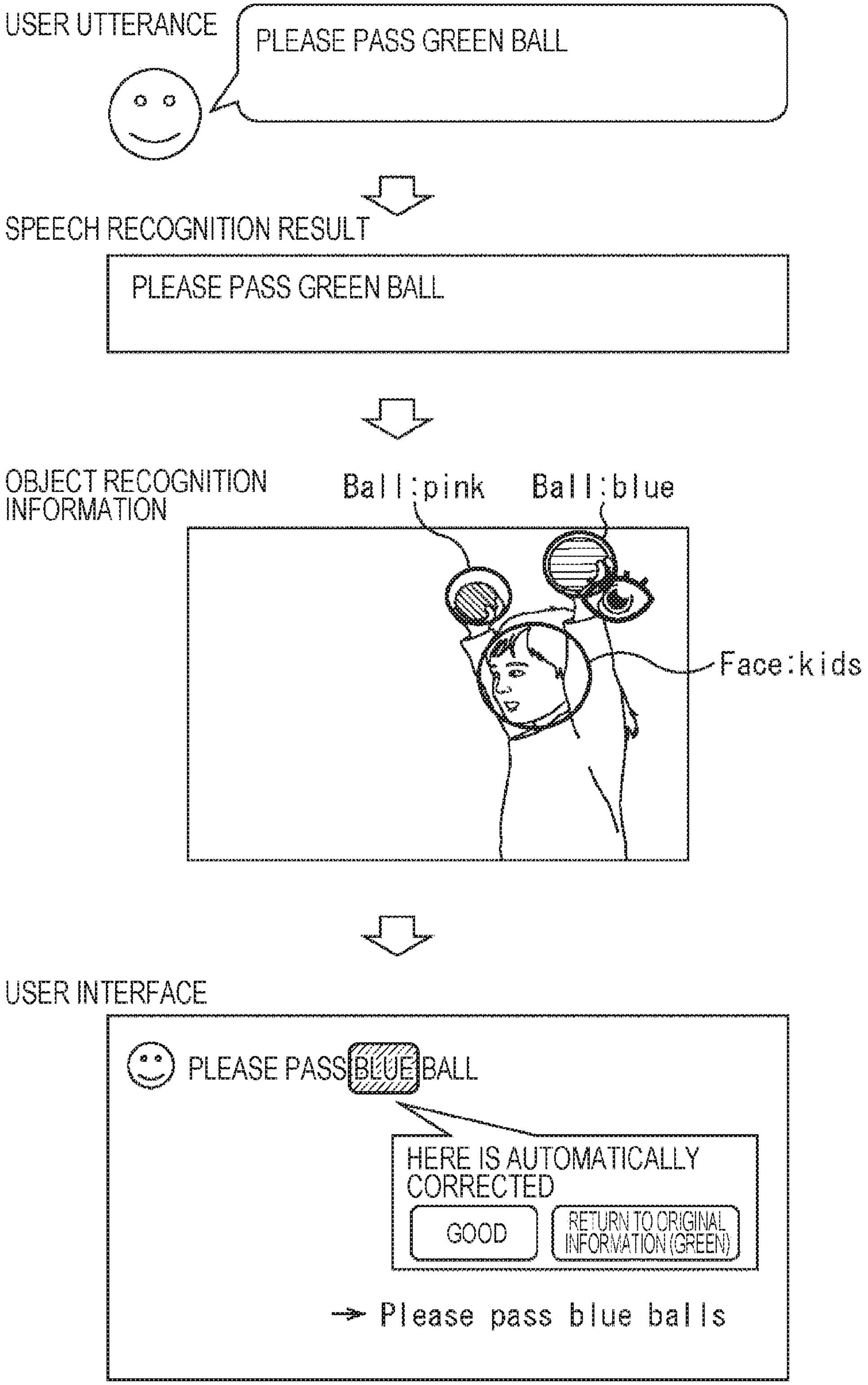

USER UTTERANCE
PLEASE PASS GREEN BALL
SPEECH RECOGNITION RESULT
PLEASE PASS GREEN BALL
OBJECT RECOGNITION INFORMATION
Ball:pink
Ball:blue
Face:kids
USER INTERFACE
PLEASE PASS BLUE BALL
HERE IS AUTOMATICALLY CORRECTED
GOOD
RETURN TO ORIGINAL INFORMATION (GREEN)
→ Please pass blue balls

FIG. 10

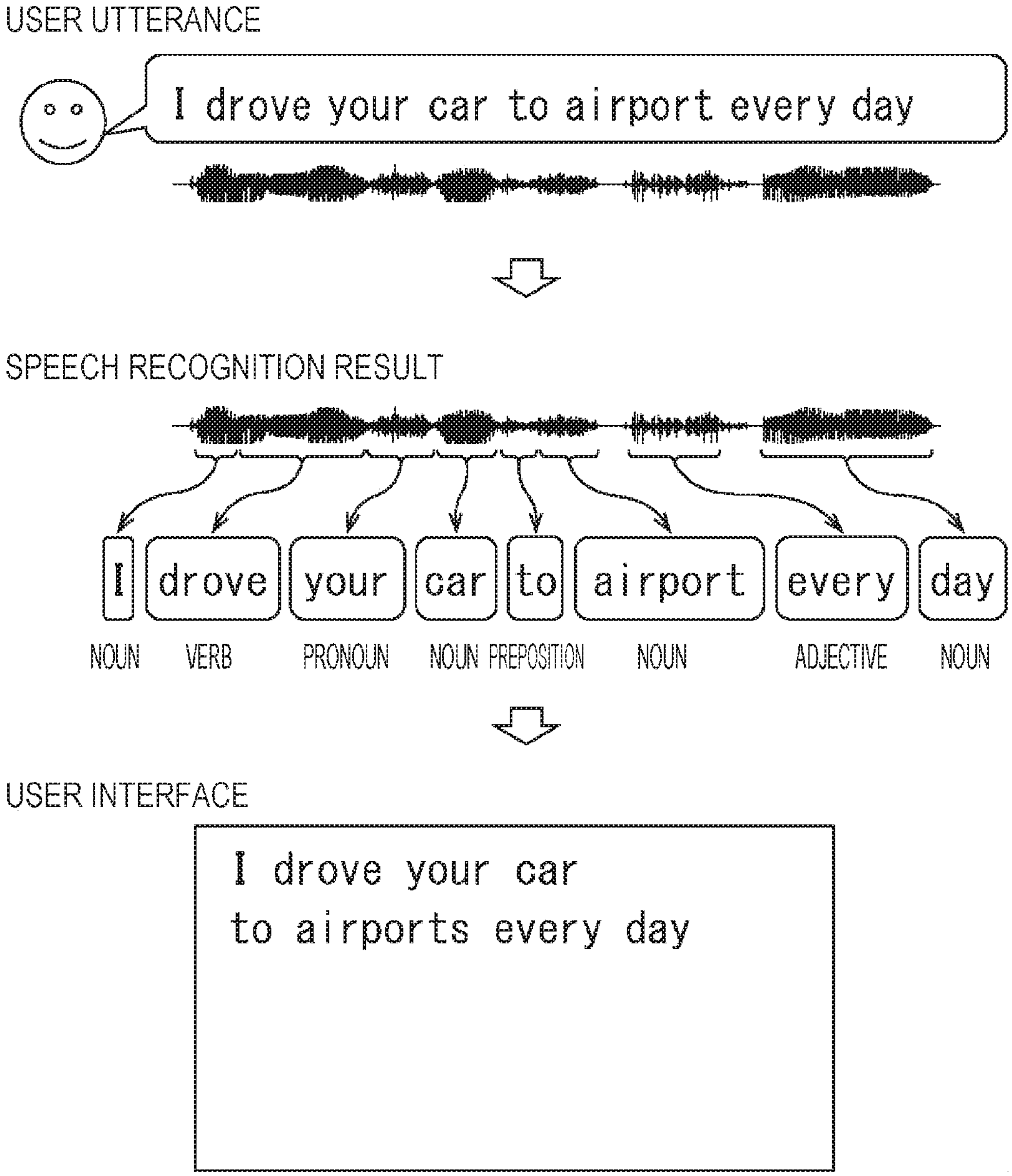

USER UTTERANCE
I drove your car to airport every day
SPEECH RECOGNITION RESULT
I
drove
your
car
to
airport
every
day
NOUN
VERB
PRONOUN
NOUN
PREPOSITION
NOUN
ADJECTIVE
NOUN
USER INTERFACE
I drove your car
to airports every day

FIG. 11

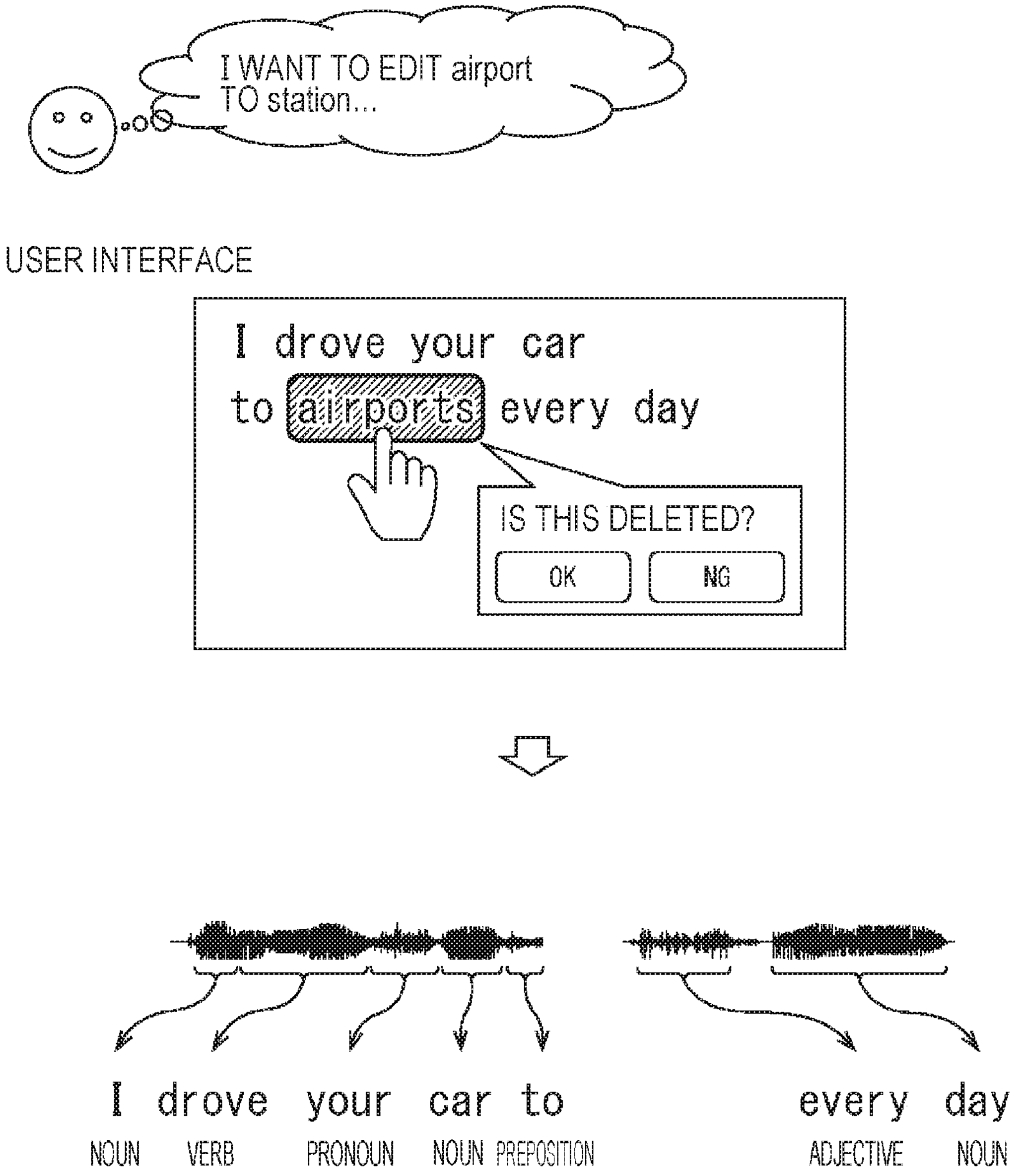

I WANT TO EDIT airport TO station...
USER INTERFACE
I drove your car
to airports every day
IS THIS DELETED?
OK
NG
I
NOUN
drove
VERB
your
PRONOUN
car
NOUN
to
PREPOSITION
every
ADJECTIVE
day
NOUN

FIG. 12

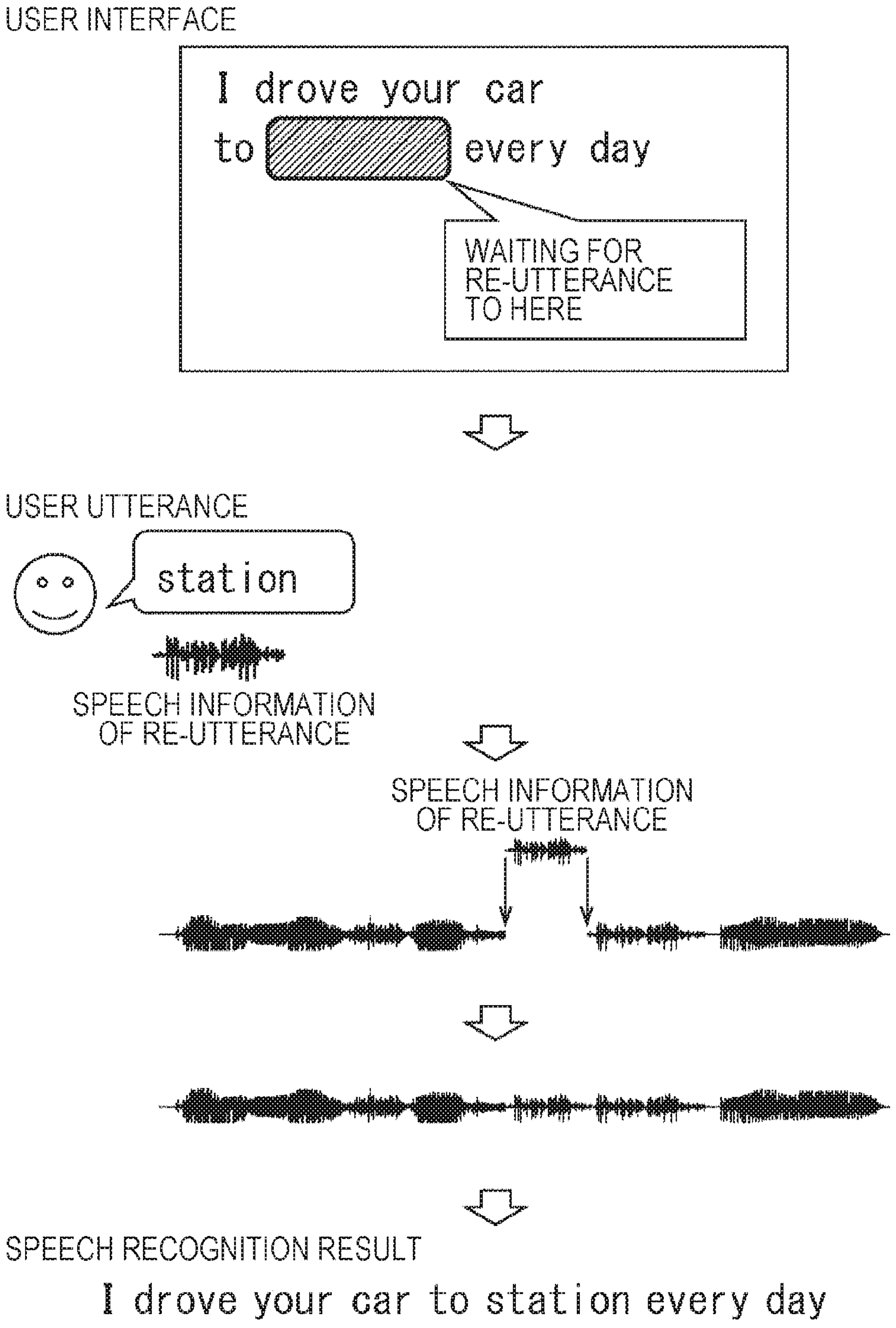
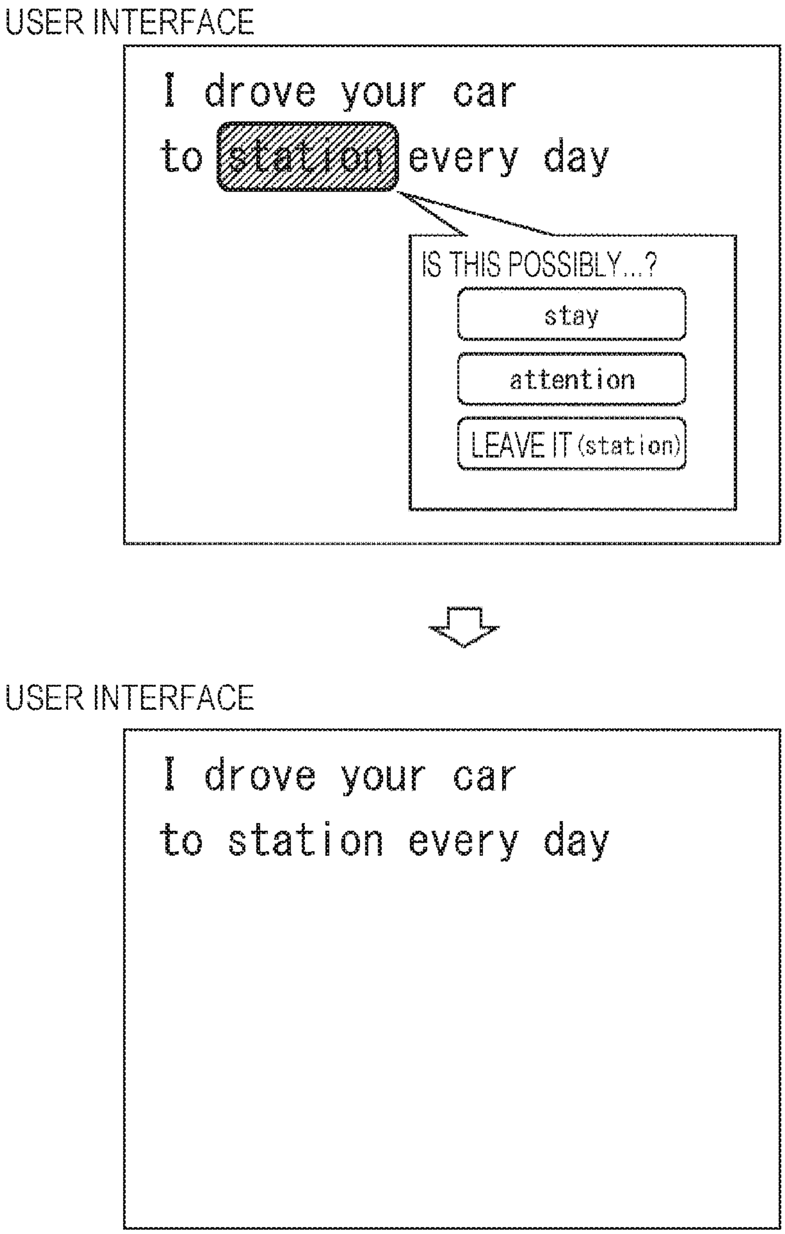

USER INTERFACE
I drove your car
to ▨ every day
WAITING FOR RE-UTTERANCE TO HERE
USER UTTERANCE
station
SPEECH INFORMATION OF RE-UTTERANCE
SPEECH INFORMATION OF RE-UTTERANCE
SPEECH RECOGNITION RESULT
I drove your car to station every day

FIG. 13



I drove your car
to station every day

I drove your car
to station every day

FIG. 14

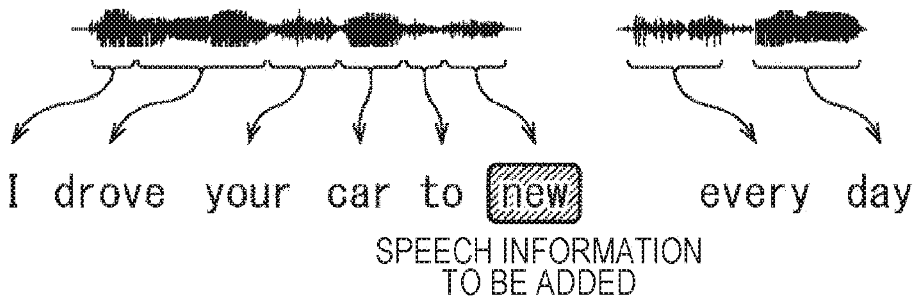

I drove your car to new every day
SPEECH INFORMATION TO BE ADDED

FIG. 15

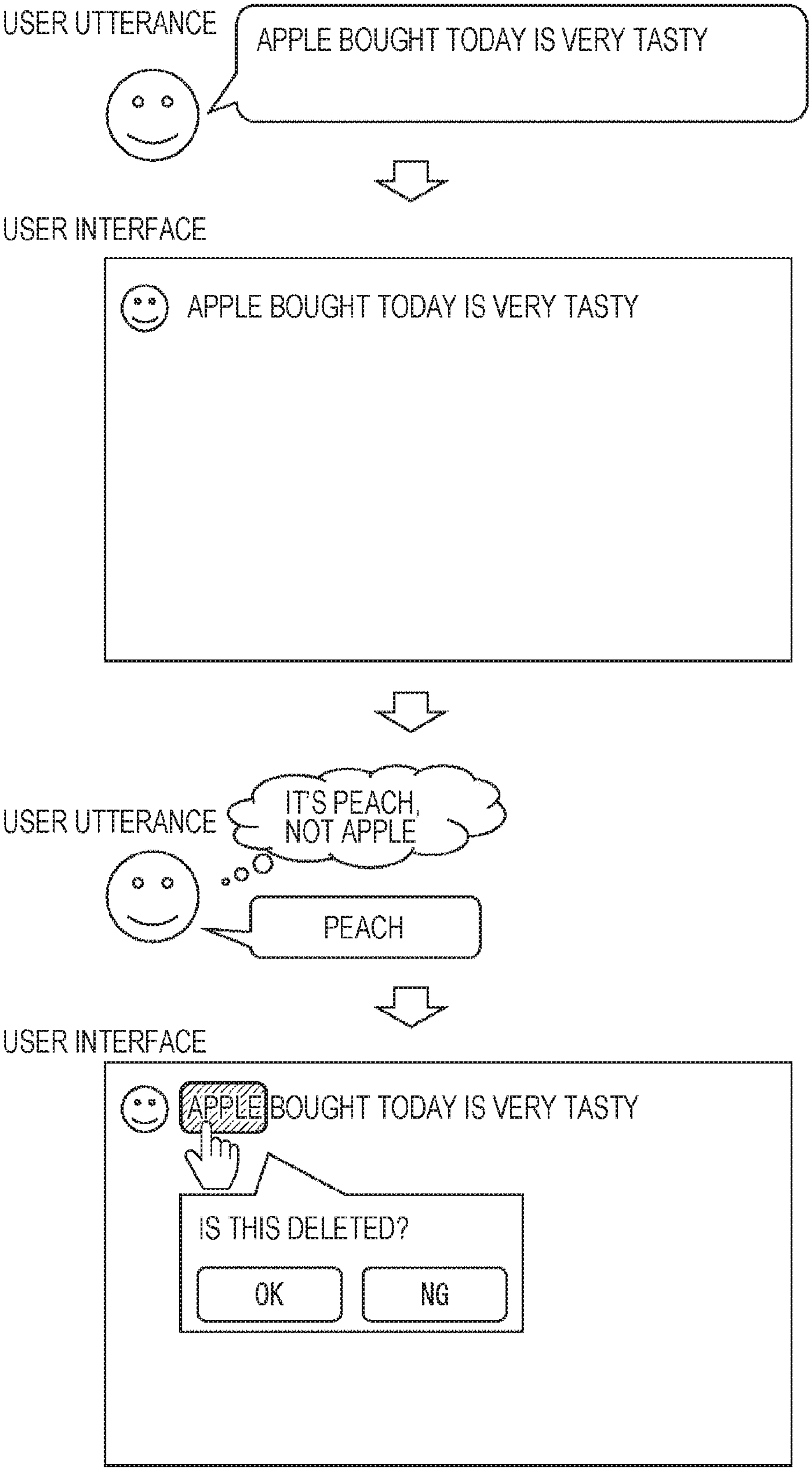

USER UTTERANCE
APPLE BOUGHT TODAY IS VERY TASTY
USER INTERFACE
APPLE BOUGHT TODAY IS VERY TASTY
USER UTTERANCE
IT'S PEACH, NOT APPLE
PEACH
USER INTERFACE
APPLE BOUGHT TODAY IS VERY TASTY
IS THIS DELETED?
OK
NG

FIG. 16

NOUN	CATEGORY
...	...
APPLE	FRUIT NAME
ORANGE	FRUIT NAME
...	...
STATION	FACILITY NAME
...	...

CATEGORY	ATTACHABLE INFORMATION	FORMAT
...	...	...
FRUIT NAME	SWEET	① [TASTY FRUIT] +"IS"+(TARGET CHARACTERS)
		② (TARGET CHARACTERS) +"IS VERY GOOD FOR YOUR BODY"
		...
FACILITY NAME	BEAUTIFUL	① "I CAME TO"+(TARGET CHARACTERS) +"THAT IS POPULAR SPOT FOR YOUNG PEOPLE"
		...

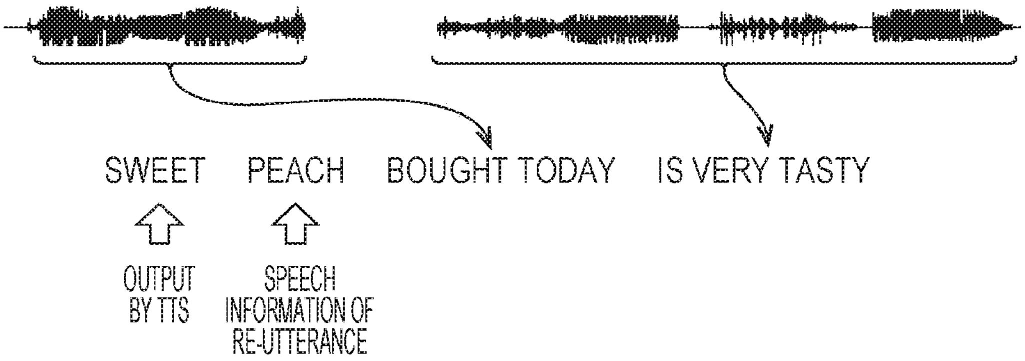


FIG. 17A

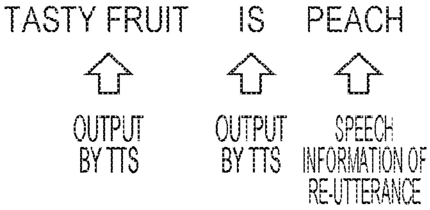


FIG. 17B

FIG. 18

- SHUFFLE WORDS

UTTERANCE: I drove your car to airport every day
RECOGNITION: I drove your car to airport every day
RE-UTTERANCE: station

- CONJUGATION OF VERB, CHANGE OF NOUN

UTTERANCE: I liked your car
RECOGNITION: I like your car
RE-UTTERANCE: liked

UTTERANCE: I liked your car
RECOGNITION: I like your cars
RE-UTTERANCE: car

- MISTAKE DUE TO SIMILAR SOUND

UTTERANCE: She attacked me
RECOGNITION: He attacked me
RE-UTTERANCE: She

- RECOGNITION FAILURE IN UNITS OF WORDS AND PHASES

UTTERANCE: I would like to go
RECOGNITION: I had to go
RE-UTTERANCE: would like

FIG. 19

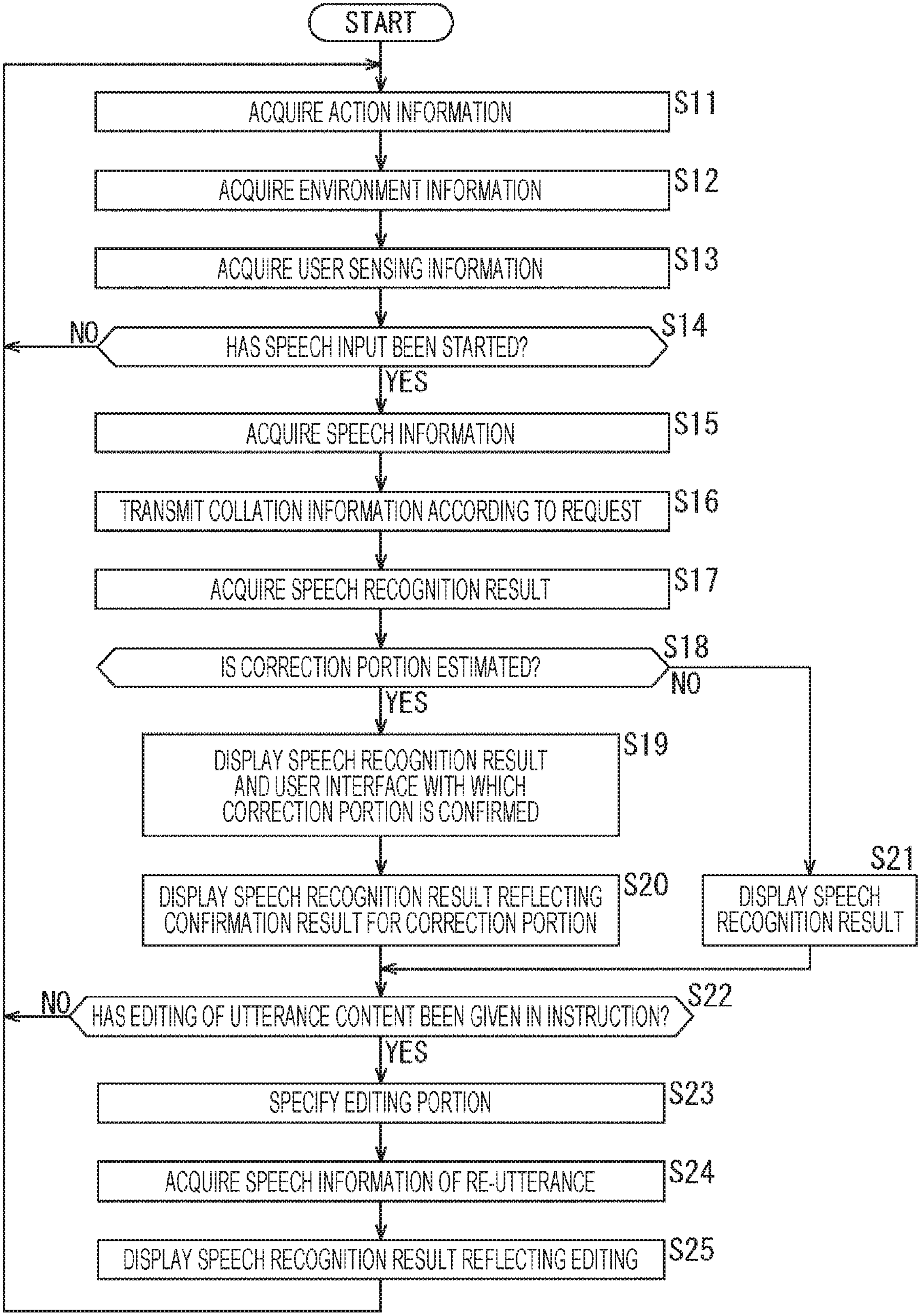

START
ACQUIRE ACTION INFORMATION
S11
ACQUIRE ENVIRONMENT INFORMATION
S12
ACQUIRE USER SENSING INFORMATION
S13
HAS SPEECH INPUT BEEN STARTED?
S14
NO
YES
ACQUIRE SPEECH INFORMATION
S15
TRANSMIT COLLATION INFORMATION ACCORDING TO REQUEST
S16
ACQUIRE SPEECH RECOGNITION RESULT
S17
IS CORRECTION PORTION ESTIMATED?
S18
NO
YES
DISPLAY SPEECH RECOGNITION RESULT AND USER INTERFACE WITH WHICH CORRECTION PORTION IS CONFIRMED
S19
DISPLAY SPEECH RECOGNITION RESULT REFLECTING CONFIRMATION RESULT FOR CORRECTION PORTION
S20
DISPLAY SPEECH RECOGNITION RESULT
S21
HAS EDITING OF UTTERANCE CONTENT BEEN GIVEN IN INSTRUCTION?
S22
NO
YES
SPECIFY EDITING PORTION
S23
ACQUIRE SPEECH INFORMATION OF RE-UTTERANCE
S24
DISPLAY SPEECH RECOGNITION RESULT REFLECTING EDITING
S25

FIG. 20

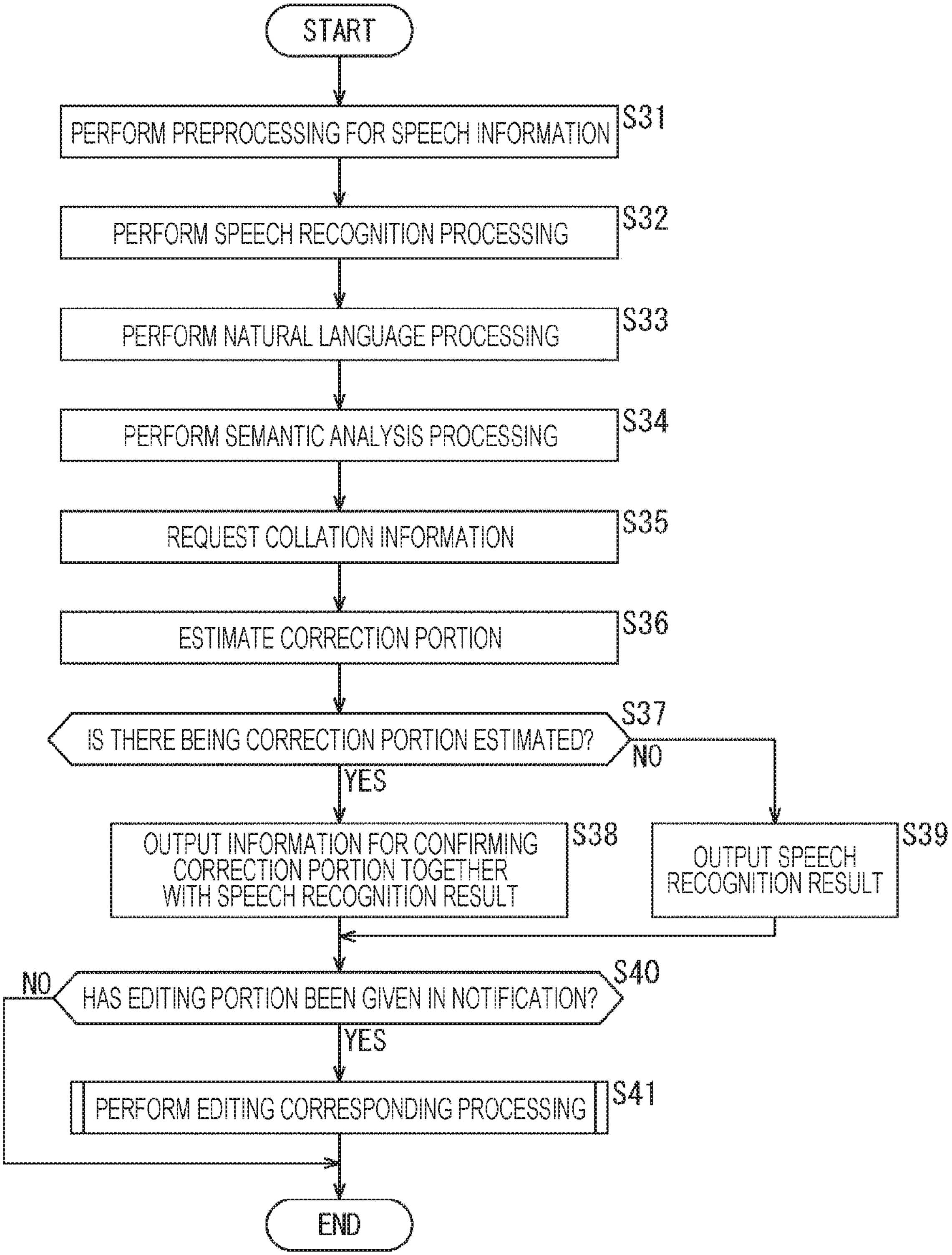

START
PERFORM PREPROCESSING FOR SPEECH INFORMATION
S31
PERFORM SPEECH RECOGNITION PROCESSING
S32
PERFORM NATURAL LANGUAGE PROCESSING
S33
PERFORM SEMANTIC ANALYSIS PROCESSING
S34
REQUEST COLLATION INFORMATION
S35
ESTIMATE CORRECTION PORTION
S36
IS THERE BEING CORRECTION PORTION ESTIMATED?
S37
NO
YES
OUTPUT INFORMATION FOR CONFIRMING CORRECTION PORTION TOGETHER WITH SPEECH RECOGNITION RESULT
S38
OUTPUT SPEECH RECOGNITION RESULT
S39
HAS EDITING PORTION BEEN GIVEN IN NOTIFICATION?
S40
NO
YES
PERFORM EDITING CORRESPONDING PROCESSING
S41
END

FIG. 21

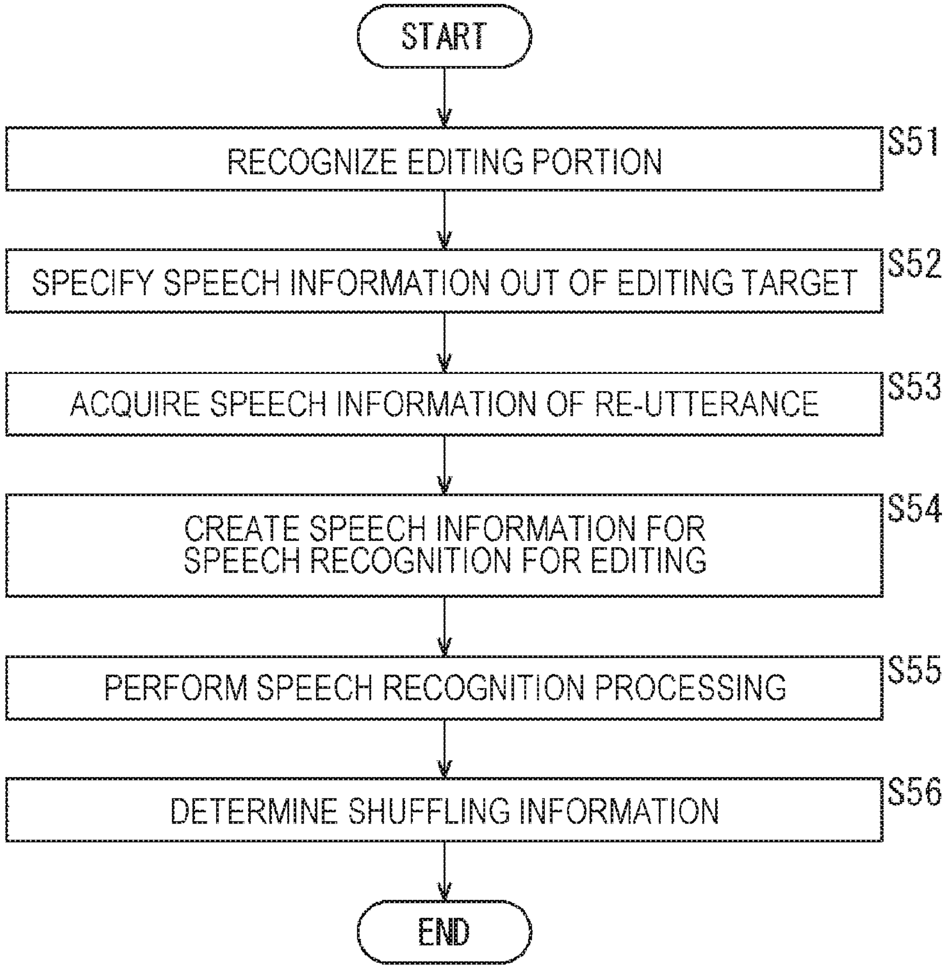
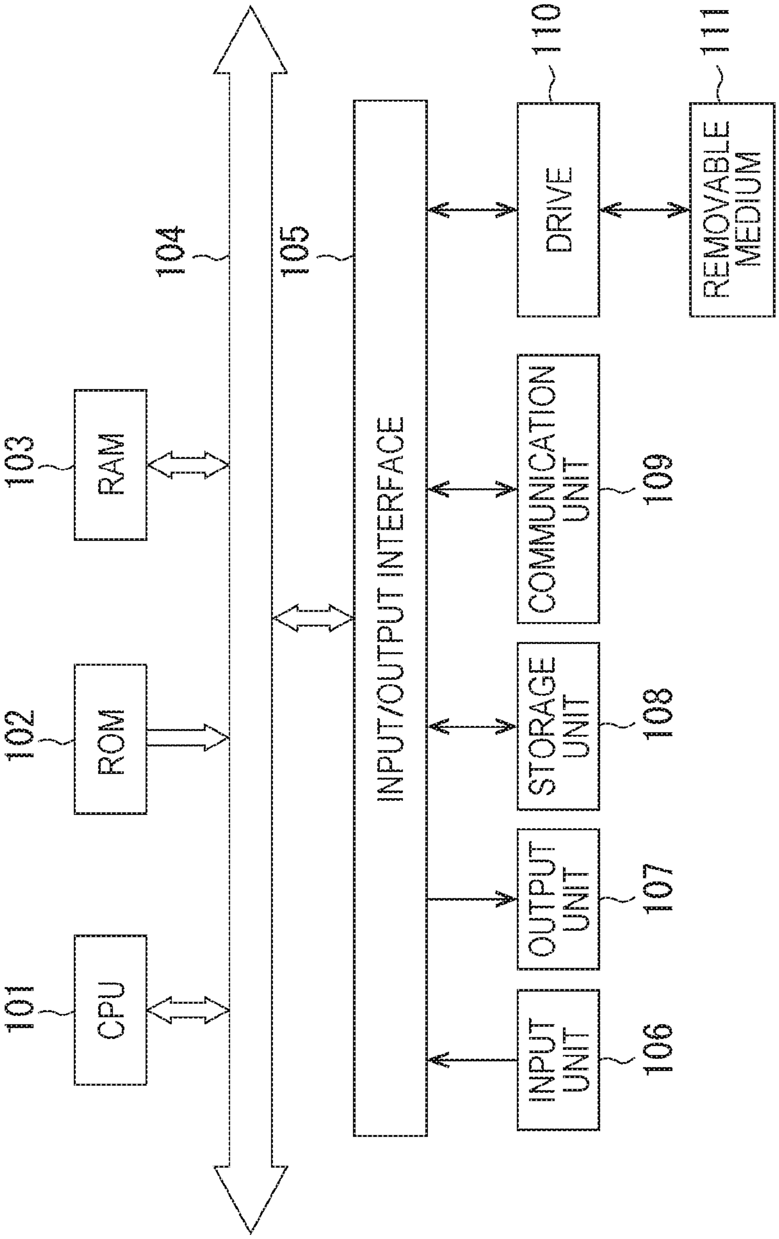

START
RECOGNIZE EDITING PORTION
S51
SPECIFY SPEECH INFORMATION OUT OF EDITING TARGET
S52
ACQUIRE SPEECH INFORMATION OF RE-UTTERANCE
S53
CREATE SPEECH INFORMATION FOR SPEECH RECOGNITION FOR EDITING
S54
PERFORM SPEECH RECOGNITION PROCESSING
S55
DETERMINE SHUFFLING INFORMATION
S56
END

FIG. 22


101
CPU
102
ROM
103
RAM
104
105
INPUT/OUTPUT INTERFACE
INPUT UNIT
106
OUTPUT UNIT
107
STORAGE UNIT
108
COMMUNICATION UNIT
109
DRIVE
110
REMOVABLE MEDIUM
111

INFORMATION PROCESSING APPARATUS AND INFORMATION PROCESSING METHOD

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a U.S. National Phase of International Patent Application No. PCT/JP2018/000014 filed on Jan. 4, 2018, which claims priority benefit of Japanese Patent Application No. JP 2017-007121 filed in the Japan Patent Office on Jan. 18, 2017. Each of the above-referenced applications is hereby incorporated herein by reference in its entirety.

TECHNICAL FIELD

The present disclosure relates to an information processing apparatus, an information processing method, and a program, and in particular to an information processing apparatus, an information processing method, and a program that enables provision of a more convenient speech recognition service.

BACKGROUND ART

In recent years, utilization of a user interface using speech input has been widespread and realization of speech recognition processing that enables more favorable speech input is important.

For example, Patent Document 1 discloses a technology of replacing a word included in a speech-recognized sentence on the basis of a language model based on context in the sentence, thereby improving accuracy of the sentence obtained as a speech recognition result.

CITATION LIST

Patent Document

Patent Document 1: Japanese Patent Application Laid-Open No. 2016-110087

SUMMARY OF THE INVENTION

Problems to be Solved by the Invention

However, in the above-described technology disclosed in Patent Document 1, the word is replaced depending on a past learning result and the like. Therefore, in a case where appropriate learning has not been performed, replacing the word as expected has been difficult. Therefore, the technology disclosed in Patent Document 1 cannot contribute to improving the accuracy of the sentence obtained as a speech recognition result, resulting in lowering the convenience as a speech recognition service.

The present technology has been made in view of the foregoing, and enables provision of a more convenient speech recognition service.

Solutions to Problems

An information processing apparatus according to one aspect of the present disclosure includes a speech recognition unit configured to perform speech recognition for speech information based on an utterance of a user, a correction portion estimation unit configured to collate content of a sentence obtained as a speech recognition result by the speech recognition unit with collation information necessary for determining accuracy of the content to estimate, for the sentence, a correction portion that requires correction, and a presenting unit configured to present, to the user, the sentence obtained as the speech recognition result together with the correction portion estimated by the correction portion estimation unit.

An information processing method or a program according to one aspect of the present disclosure includes performing speech recognition for speech information based on an utterance of a user, collating content of a sentence obtained as a speech recognition result with collation information necessary for determining accuracy of the content to estimate, for the sentence, a correction portion that requires correction, and presenting, to the user, the sentence obtained as the speech recognition result together with the estimated correction portion.

In one aspect of the present disclosure, speech recognition for speech information based on an utterance of a user is performed, and a correction portion that requires correction is estimated for a sentence obtained as a speech recognition result by collating content of the sentence with collation information necessary for determining accuracy of the content. Then, the sentence obtained as the speech recognition result is presented together with the estimated correction portion to the user.

Effects of the Invention

According to one aspect of the present disclosure, a more convenient speech recognition service can be provided.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a block diagram illustrating a configuration example of an embodiment of a speech recognition system to which the present technology is applied.

FIG. **2** is a diagram illustrating a configuration example of a client terminal.

FIG. **3** is a block diagram illustrating a configuration example of a speech recognition server.

FIG. **4** is a diagram illustrating a first example of a user interface that presents a correction portion estimated on the basis of action information.

FIG. **5** is a diagram illustrating a second example of the user interface that presents a correction portion estimated on the basis of action information.

FIG. **6** is a diagram illustrating a first example of a user interface that presents a correction portion estimated on the basis of weather information.

FIG. **7** is a diagram illustrating a second example of the user interface that presents a correction portion estimated on the basis of weather information.

FIG. **8** is a diagram for describing recognition of an object located ahead of a line of sight of a user.

FIG. **9** is a diagram illustrating an example of a user interface that presents a correction portion estimated on the basis of object recognition information.

FIG. **10** is a diagram for describing an example of speech recognition processing.

FIG. **11** is a diagram illustrating an example of a user interface for editing a speech recognition result.

FIG. **12** is a diagram for illustrating editing corresponding processing.

FIG. **13** is a diagram for describing display of a speech recognition result reflecting editing.

FIG. **14** is a diagram for describing an example of adding specific speech information before a portion to which speech information of re-utterance is connected.

FIG. **15** is a diagram illustrating an example of a user interface for editing a speech recognition result.

FIG. **16** is a diagram illustrating an example of a database referred to for generation of speech information for editing speech recognition.

FIGS. **17**A and **17**B are diagrams for illustrating an example of speech information for editing speech recognition using sound information other than utterance.

FIG. **18** is a diagram for illustrating a case where various types of editing based on re-utterance of the user.

FIG. **19** is a flowchart for describing processing executed in a client terminal.

FIG. **20** is a flowchart for describing processing executed in a speech recognition server.

FIG. **21** is a flowchart for describing editing corresponding processing.

FIG. **22** is a block diagram illustrating a configuration example of an embodiment of a computer to which the present technology is applied.

MODE FOR CARRYING OUT THE INVENTION

Hereinafter, specific embodiments to which the present technology is applied will be described in detail with reference to the drawings.

<Configuration Example of Speech Recognition System>

FIG. **1** is a block diagram illustrating a configuration example of an embodiment of a speech recognition system to which the present technology is applied.

As illustrated in FIG. **1**, a speech recognition system **11** is configured such that a plurality (N in the example in FIG. **1**) client terminals **13-1** to **13**-N and a speech recognition server **14** are connected via a network **12** such as the Internet. Note that the client terminals **13-1** to **13**-N are similarly configured and are referred to as client terminal **13** as appropriate in a case where there is no need to distinguish one another.

Furthermore, a news server **15** that provides information regarding general news and weather and an encyclopedia server **16** that provides information regarding knowledge and commentary on various fields are connected to the network **12**. Note that, in the present embodiment to be described below, the information provided by the news server **15** and the encyclopedia server **16** is also referred to as fact information.

For example, in the speech recognition system **11**, speech information based on utterance of a user who possesses each client terminal **13** is transmitted to the speech recognition server **14** via the network **12**, and speech recognition processing is executed in the speech recognition server **14**. Then, the speech recognition server **14** transmits a sentence (character information) containing a word string obtained as a speech recognition result to the client terminal **13** of the user who has made the utterance via the network **12**. As a result, the client terminal **13** can display and present the speech recognition result of the utterance of the user to the user.

The speech recognition system **11** configured as described above can provide speech recognition processing that enables more favorable speech input even if processing capability of an individual client terminal **13** is low by installing latest high-performance speech recognition processing in the speech recognition server **14**, for example.

FIG. **2** is a diagram illustrating a configuration example of a client terminal **13**.

As illustrated in FIG. **2**, the client terminal **13** includes an speech information acquisition unit **21**, a video output unit **22**, an operation input unit **23**, an speech output unit **24**, an action information acquisition unit **25**, an environment information acquisition unit **26**, a line-of-sight information acquisition unit **27**, an object recognition unit **28**, a recording unit **29**, a communication unit **30**, and a speech recognition result corresponding processing unit **31**.

The speech information acquisition unit **21** is configured by, for example, a microphone for acquiring the speech information, and acquires the speech information based on the speech uttered by the user and supplies the speech information to the communication unit **30**. Then, the speech information is transmitted from the communication unit **30** to the speech recognition server **14** via the network **12** in FIG. **1**.

The video output unit **22** is configured by, for example, a display for outputting video, and displays the speech recognition result based on the utterance of the user and presents the speech recognition result to the user. Furthermore, the video output unit **22** displays various user interfaces used in processing of correcting or editing the speech recognition result, for example, as will be described with reference to FIGS. **4**, **5**, **6**, **7**, **8**, **9**, **10**, **11**, **12**, **13**, **14**, **15**, **16**, **17**A, and **17**B below.

The operation input unit **23** is configured by, for example, a touch panel for inputting a touch operation of the user on the display constituting the video output unit **22**. Then, when the user performs a touch operation on the user interface displayed on the video output unit **22**, the operation input unit **23** supplies operation information indicating content of an operation input by the touch operation to the speech recognition result corresponding processing unit **31**.

The sound output unit **24** is configured by, for example, a speaker or the like for outputting a speech, and outputs the speech recognition result for the speech information based on the utterance of the user by synthetic speech (text to speech (TSS)).

The action information acquisition unit **25** is configured by, for example, a global positioning system (GPS) device, an acceleration sensor, and the like, and regularly acquires position information, acceleration information, and the like associated with an action of the user as action information and successively supplies the action information to the recording unit **29**.

The environment information acquisition unit **26** is configured by, for example, a temperature sensor, a humidity sensor, and the like, and regularly acquires temperature, humidity, and the like indicating an environment around the user as environment information and successively supplies the environmental information to the recording unit **29**.

The line-of-sight information acquisition unit **27** is configured by, for example, an imaging device capable of imaging movement of a pupil of the user, and acquires line-of-sight information indicating a direction of a line of sight of the user and supplies the line-of-sight information to the object recognition unit **28**.

The object recognition unit **28** is configured by, for example, an imaging device capable of imaging an object located ahead of the line of sight of the user, and specifies an object recognized by the user on the basis of the line-of-sight information supplied from the line-of-sight information acquisition unit **27** and performs object recognition processing for the specified object. Then, the object recognition unit **28** supplies object recognition information indicating a result of the recognition of the object to the recording unit **29** together with the line-of-sight information.

The recording unit **29** is configured of, for example, a memory, a hard disk drive, and the like, and records the action information supplied from the action information acquisition unit **25**, the environment information supplied from the environment information acquisition unit **26**, and the line-of-sight information and the object recognition information supplied from the object recognition unit **28**.

The communication unit **30** is configured by a communication module for performing communication via the network **12**, and transmits and receives various types of information to and from the speech recognition server **14**. For example, the recording unit **29** transmits the speech information supplied from the speech information acquisition unit **21** to the speech recognition server **14** and supplies the speech recognition result transmitted from the speech recognition server **14** to the speech recognition result corresponding processing unit **31**. Furthermore, when information requesting collation information is transmitted from the speech recognition server **14**, as described below, the communication unit **30** reads information according to the request from among the various types of information recorded in the recording unit **29** as the collation information and supplies the read information to the speech recognition server **14**.

When the speech recognition result transmitted from the speech recognition server **14** is supplied from the communication unit **30**, the speech recognition result corresponding processing unit **31** supplies a sentence (character information) indicating the speech recognition result to the video output unit **22** to display the sentence. Furthermore, in a case where information for confirming a correction portion is added to the speech recognition result, the speech recognition result corresponding processing unit **31** generates a user interface for confirming a correction portion according to the information and causes the video output unit **22** to display the user interface together with the speech recognition result. Then, when the operation information according to the touch operation of the user on the user interface for confirming a correction portion is supplied from the operation input unit **23**, the speech recognition result corresponding processing unit **31** reflects correction for the speech recognition result according to the operation information.

Furthermore, when operation information instructing editing is supplied from the operation input unit **23** to the speech recognition result displayed on the video output unit **22**, the speech recognition result corresponding processing unit **31** specifies an object to be edited instructed by the user. Then, the speech recognition result corresponding processing unit **31** transmits information indicating the object to be edited to the speech recognition server **14** via the communication unit **30**, and causes the video output unit **22** to display a user interface prompting re-utterance for deleting and replacing an editing portion specified as the object to be edited. Thereafter, the speech information of the re-utterance acquired by the speech information acquisition unit **21** is transmitted to the speech recognition server **14**, speech recognition for the speech information of the re-utterance is performed, and replacement information for replacing the correction portion is transmitted. As a result, the speech recognition result corresponding processing unit **31** supplies a speech recognition result reflecting the editing by replacing the correction portion with the replacement information to the video output unit **22** and causes the video output unit **22** to present the speech recognition result to the user.

FIG. **3** is a block diagram illustrating a configuration example of a speech recognition server **14**.

As illustrated in FIG. **3**, the speech recognition server **14** includes a communication unit **41**, an input sound processing unit **42**, a speech recognition unit **43**, a natural language processing unit **44**, a semantic analysis processing unit **45**, a correction portion estimation processing unit **46**, a collation information acquisition unit **47**, an editing corresponding processing unit **48**, and a speech recognition result output processing unit **49**.

The communication unit **41** is configured by a communication module for performing communication via the network **12**, and transmits and receives various types of information to and from the client terminal **13**. For example, the communication unit **41** receives the speech information transmitted from the client terminal **13** and supplies the speech information to the input sound processing unit **42**, and transmits the speech recognition result information supplied from the speech recognition result output processing unit **49** to the client terminal **13**.

The input sound processing unit **42** performs various types of preprocessing necessary for the speech information supplied from the communication unit **41** before performing speech recognition in the speech recognition unit **43**. For example, the input sound processing unit **42** excludes a section of silence and a section of only noise in the speech information, performs voice activity detection (VAD) processing of detecting an utterance section including an uttered speech from the speech information, and supplies the speech information in the utterance section to the speech recognition unit **43**.

The speech recognition unit **43** performs speech recognition for the speech information supplied from the input sound processing unit **42**, recognizes the utterance of the user based on the speech information for each word, and outputs a sentence containing a word string to the natural language processing unit **44** as a speech recognition result.

The natural language processing unit **44** performs natural language processing (morphological analysis, syntax analysis, and the like) of recognizing the sentence representing the speech recognition result supplied from the speech recognition unit **43** as a natural language daily used by humans and supplies the speech recognition result to which the natural language processing has been applied to the semantic analysis processing unit **45**. For example, the natural language processing unit **44** can specify a part of speech of each word constituting the sentence by performing the natural language processing.

The semantic analysis processing unit **45** performs semantic analysis processing of analyzing the meaning of the sentence for the sentence representing the speech recognition result to which the natural language processing has been applied in the natural language processing unit **44** and supplies content (semantic analysis result) of the sentence indicated by the speech recognition result to the correction portion estimation processing unit **46**.

The correction portion estimation processing unit **46** performs processing of estimating, for the sentence, a correction portion that requires correction on the basis of accuracy of the content of the sentence indicated by the speech recognition result supplied from the semantic analysis processing unit **45**. At this time, the correction portion estimation processing unit **46** acquires collation information necessary for determining the accuracy of the content of the sentence indicated by the speech recognition result via the collation information acquisition unit **47**. For example, the fact information including various data such as action data, weather data, and statistical data can be used as the collation information. In other words, as described above, the action information, the environment information, the line-of-sight information, the object recognition information, and the like recorded in the client terminal **13** can be used as the collation information. Furthermore, news information, weather information, and the like provided by the news server **15**, and various articles provided by the encyclopedia server **16** can be used as the collation information. In addition, for example, various types of fact information confirmed as facts such as "the number of visitors to the oo theme park on the previous day was one million" and "traffic jam on the **00** highway on the previous day was an average of 15 km" can be used as the collation information. Then, the correction portion estimation processing unit **46** collates content of the sentence indicated by the speech recognition result with the collation information and notifies the correction portion to the speech recognition result output processing unit **49** in a case of estimating that there is the correction portion that requires correction, as described below with reference to FIGS. **4** to **9**.

The collation information acquisition unit **47** transmits information requesting the collation information required by the correction portion estimation processing unit **46** via the communication unit **41**, acquires the collation information transmitted in response to the request, and supplies the collation information to the correction portion estimation processing unit **46**. For example, in a case where the collation information required by the correction portion estimation processing unit **46** is the action information of the user, the collation information acquisition unit **47** requests the client terminal **13** to transmit the action information of the user. Furthermore, in a case where the collation information required by the correction portion estimation processing unit **46** is the weather information, the collation information acquisition unit **47** requests the news server **15** to transmit the weather information.

The editing corresponding processing unit **48** deletes phoneme information of a word specified as an object to be edited from the stored speech information of the speech recognition result, and connects the speech information of the re-utterance to the deleted editing portion to create speech information for editing speech recognition, as described below with reference to FIGS. **10** to **13**. Then, the editing corresponding processing unit **48** supplies the speech information for editing speech recognition to the speech recognition unit **43** to perform speech recognition, thereby acquiring a word indicated by the speech information of the re-utterance as the replacement information, and supplies the replacement information to the speech recognition result output processing unit **49**.

In a case where the correction portion that requires correction has been estimated for the sentence indicated by the speech recognition result by the correction portion estimation processing unit **46**, the speech recognition result output processing unit **49** adds information for confirming the estimated correction portion to the speech recognition result and transmits the speech recognition result to the client terminal **13** via the communication unit **41**. Note that, in a case where the correction portion that requires correction has not been estimated for the sentence indicated by the speech recognition result by the correction portion estimation processing unit **46**, the speech recognition result output processing unit **49** transmits only the speech recognition result to the client terminal **13**.

Furthermore, when the replacement information is supplied from the editing corresponding processing unit **48**, the

speech recognition result output processing unit **49** transmits the replacement information to the client terminal **13** via the communication unit **41**. Furthermore, in a case of transmitting a synthesized speech as the speech recognition result, the speech recognition result output processing unit **49** can generate and transmit a synthesized speech that reads out the sentence indicated by the speech recognition result.

In the speech recognition system **11** including the client terminal **13** and the speech recognition server **14** configured as described above, the speech recognition server **14** collates the content of the sentence obtained as the speech recognition result with the collation information necessary for determining the accuracy of the content and can estimate, for the sentence, the correction portion that requires correction. Here, as the collation information, the fact information provided by the news server **15** and the encyclopedia server **16**, the action information of the user recorded in the client terminal **13**, and the like are used.

Then, the speech recognition server **14** transmits the information for confirming the correction portion to the client terminal **13** together with the speech recognition result. In response to the transmission, the client terminal **13** displays the user interface for confirming the correction portion estimated in the speech recognition server **14** and can reflect correction on the speech recognition result when an operation to instruct the correction of the correction portion is performed by the user.

Moreover, in the speech recognition system **11**, the client terminal **13** can specify an object to be edited when an operation to instruct editing of the sentence of the speech recognition result is performed by the user. Then, the client terminal **13** transmits the speech information of the re-utterance to the speech recognition server **14**. In response to the transmission, the speech recognition server **14** deletes the editing portion to be the object to be edited from the stored speech information, performs speech recognition after connecting the speech information of the re-utterance to the editing portion, and transmits the speech recognition result reflecting the editing to the client terminal **13**.

As a result, the client terminal **13** can display and present the speech recognition result reflecting the editing to the user. Note that the speech recognition system **11** may specify the correction portion as the object to be edited when correcting the correction portion estimated by the speech recognition server **14**, for example, and can correct (edit) the correction portion according to the speech information of the re-utterance for correcting the correction portion.

As described above, the speech recognition system **11** can easily correct or edit the sentence obtained as the speech recognition result by estimating the correction portion for the sentence of the speech recognition result and reflecting the editing by the user. As a result, the speech recognition system **11** can provide a more convenient speech recognition service.

<Example of User Interface for Presenting Correction Portion>

User interfaces presenting a correction portion estimated for a sentence obtained as a speech recognition result will be described with reference to FIGS. **4** to **9**.

FIG. **4** illustrates a first example of the user interface presenting the correction portion estimated for the sentence obtained as the speech recognition result on the basis of the action information. For example, it is assumed that, in creating a message informing an event on a day when the day is done such as before going to bed, the user utters, to the client terminal **13**, "I went to Ebisu during the day and shopped in Ikebukuro until 17 o'clock".

First, in the client terminal **13**, the speech information acquisition unit **21** acquires the speech information based on the utterance of the user, and the communication unit **30** transmits the speech information to the speech recognition server **14**.

Then, in the speech recognition server **14**, the speech recognition unit **43** performs speech recognition for the speech information to acquire the speech recognition result "I went to Ebisu during the day and shopped in Ikebukuro until 17 o'clock". Then, the correction portion estimation processing unit **46** recognizes that the action information of the user is necessary as the collation information for determining the accuracy of the content (a time zone and a place) of the sentence indicated by such a speech recognition result. In response to the recognition, the collation information acquisition unit **47** transmits, to the client terminal **13**, information requesting the action information of the user in the time zone based on the sentence indicated by the speech recognition result as the collation information.

In the client terminal **13**, according to the information requesting the action information of the user as the collation information, the communication unit **30** reads out information according to the request from among various information recorded in the recording unit **29** and transmits the read information to the speech recognition server **14** as the collation information.

In response to the transmission, in the speech recognition server **14**, the collation information acquisition unit **47** acquires the action information transmitted from the client terminal **13** and supplies the action information to the correction portion estimation processing unit **46**. The correction portion estimation processing unit **46** collates the content of the sentence indicated by the speech recognition result with the action information of the user and estimates, for the sentence, whether or not there is a correction portion that requires correction. For example, in a case where the place in the time zone indicated by the speech recognition result does not match the place indicated by the action information in the time zone, the correction portion estimation processing unit **46** can estimate that the place indicated by the speech recognition result as the correction portion.

In the example illustrated in FIG. **4**, the correction portion estimation processing unit **46** collates the place "Ebisu" in the time zone "day" indicated by the speech recognition result with the place indicated in the action information in the time zone. Similarly, the correction portion estimation processing unit **46** collates the place "Ikebukuro" in the time zone "17 o'clock" indicated by the speech recognition result with the place indicated in the action information in the time zone. As a result, since the place "Ikebukuro" in the time zone "17 o'clock" indicated by the speech recognition result does not match the place "Shinjuku" indicated in the action information in the time zone, the correction portion estimation processing unit **46** estimates the place "Ikebukuro" indicated by the speech recognition result as the correction portion.

The correction portion estimation processing unit **46** adds the information for confirming the correction portion to the speech recognition result on the basis of the estimation and transmits the speech recognition result to the client terminal **13**. Therefore, the client terminal **13** can display the user interface for confirming the word estimated as the correction portion together with the sentence indicating the speech recognition result according to the information for confirming the correction portion.

In the example illustrated in FIG. **4**, a user interface "Is this correct?" for confirming whether or not the place is correct is displayed for the place "Ikebukuro" estimated as the correction part. Furthermore, a GUI (YES button/NO button) for inputting a confirmation result by the user is displayed on the user interface. Note that the characters of the place "Ikebukuro" estimated as the correction portion may be highlighted, may be displayed by changing color and size, or may be displayed in a blinking manner. Furthermore, a synthesized speech "Is this correct?" may be output.

In a case where the user thinks that the place "Ikebukuro" indicated by the speech recognition result is correct, the user performs a touch operation on the Yes button on the user interface. With the touch operation, the place "Ikebukuro" indicated by the speech recognition result is determined. On the other hand, in a case where the user thinks that the place "Ikebukuro" indicated by the speech recognition result is incorrect, the user performs a touch operation on the No button on the user interface. With the touch operation, the user can easily correct the place "Ikebukuro" indicated by the speech recognition result. For example, in this case, processing of deleting the correction portion, displaying the user interface prompting the user to perform re-utterance, and replacing the correction portion on the basis of speech information of the re-utterance can be performed.

Next, FIG. **5** illustrates a second example of the user interface presenting the correction portion estimated for the sentence obtained as the speech recognition result on the basis of the action information. For example, it is assumed that, in creating a message informing an event on a day when the day is done such as before going to bed, the user utters, to the client terminal **13**, "I went to Ebisu during the day and shopped at the XYZ shop at 17 o'clock".

Similarly to the description given with reference to FIG. **4**, the correction portion estimation processing unit **46** requests the action information of the user as the collation information for determining the accuracy of the content (the time zone and the place) of the sentence indicated by the speech recognition result, and collates the content of the sentence indicated by the speech recognition result with the action information of the user. As a result, in the example illustrated in FIG. **5**, the place "XYZ shop" in the time zone "17 o'clock" indicated by the speech recognition result does not match the place "Shinjuku" indicated in the action information in the time zone, and thus the correction portion estimation processing unit **46** estimates the place "XYZ shop" indicated by the speech recognition result as the correction portion.

A user interface for confirming whether or not the place "XYZ shop" estimated as the correction portion is correct "Here is Shinjuku in the record. Is this (XYZ shop) correct?" is displayed on the basis of the estimation. Furthermore, a GUI (YES button/NO button) for inputting a confirmation result by the user is displayed on the user interface.

In a case where the user thinks that the place "XYZ shop" indicated by the speech recognition result is correct, the user performs a touch operation on the Yes button on the user interface. With the touch operation, the place "XYZ shop" indicated by the speech recognition result is determined. On the other hand, in a case where the user thinks that the place "XYZ shop" indicated by the speech recognition result is incorrect, the user performs a touch operation on the No button on the user interface. In this case, the place "XYZ shop" indicated by the speech recognition result is corrected to "Shinjuku".

As described with reference to FIGS. **4** and **5**, in a case where there is a difference between granularity of the information recorded in the client terminal **13** and granularity of the information in the sentence representing the speech recognition result, the speech recognition system **11** can estimate the information as correction portion and present the correction portion together with the speech recognition result.

Next, FIG. **6** illustrates a first example of the user interface presenting the correction portion estimated for the sentence obtained as the speech recognition result on the basis of the weather information. For example, it is assumed that, in creating a message informing an event on a day when the day is done such as before going to bed, the user utters "Today was sunny" to the client terminal **13**.

First, in the client terminal **13**, the speech information acquisition unit **21** acquires the speech information based on the utterance of the user, and the communication unit **30** transmits the speech information to the speech recognition server **14**.

Then, in the speech recognition server **14**, the speech recognition unit **43** performs speech recognition for the speech information to acquire the speech recognition result "Today was stormy" (the speech recognition unit **43** incorrectly acquires the speech recognition because of similar pronunciations). With the acquisition, the correction portion estimation processing unit **46** recognizes that the weather information of the day is necessary as the collation information for determining whether or not the content (weather) of the sentence indicated by such a speech recognition result is accurate. Therefore, the collation information acquisition unit **47** requests the news server **15** to transmit the weather information of the day.

Thereafter, in the speech recognition server **14**, the collation information acquisition unit **47** acquires the weather information transmitted from the news server **15** and supplies the news information to the correction portion estimation processing unit **46**. The correction portion estimation processing unit **46** collates the content of the sentence indicated by the speech recognition result with the weather information and estimates the correction portion that requires correction for the sentence. For example, the correction portion estimation processing unit **46** can estimate the weather of the speech recognition result not matching the weather information as the correction portion.

In the example illustrated in FIG. **6**, the correction portion estimation processing unit **46** collates the weather "stormy" of the speech recognition result with the weather information. Then, when the correction portion estimation processing unit **46** recognizes that the weather on the day was not "stormy" according to the weather information, the correction portion estimation processing unit **46** can estimate the weather "stormy" of the speech recognition result as the correction portion.

The correction portion estimation processing unit **46** adds the information for confirming the correction portion to the speech recognition result on the basis of the estimation and transmits the speech recognition result to the client terminal **13**. Therefore, the client terminal **13** can display the user interface for confirming the word estimated as the correction portion together with the sentence indicating the speech recognition result according to the information for confirming the correction portion.

In the example illustrated in FIG. **6**, the weather "stormy" estimated as the correction portion in the speech recognition result is automatically corrected to the weather "sunny", and a user interface for confirming whether or not the correction is correct "Here has been automatically corrected" is displayed. Furthermore, a GUI (good button/return to original information (stormy) button) for inputting a confirmation result by the user is displayed on the user interface.

In a case where the user thinks that the weather "sunny" indicated by the automatically corrected speech recognition result is correct, the user performs a touch operation on the good button on the user interface. As a result, the weather "sunny" indicated by the speech recognition result is determined. On the other hand, in a case where the user thinks that the weather "sunny" indicated by the automatically corrected speech recognition result is incorrect, the user performs a touch operation on the return to original information (stormy) button on the user interface. In this case, the weather "sunny" indicated by the automatically corrected speech recognition result is corrected to "stormy".

Next, FIG. **7** illustrates a second example of the user interface presenting the correction portion estimated for the sentence obtained as the speech recognition result on the basis of the weather information. For example, it is assumed that, in talking with a virtual agent using the speech recognition function provided by the speech recognition system **11**, the user utters "Today was sunny" to the client terminal **13**.

In response to the utterance, the correction portion estimation processing unit **46** estimates the weather "stormy" of the speech recognition result as the correction portion because the weather information is not "stormy", similarly to the description given with reference to FIG. **6**.

Then, in the example illustrated in FIG. **7**, in a response of the agent "Today was sunny here/Is stormy correct?" to the utterance of the user "Today was sunny" is displayed, so that the information to be corrected is notified. In response to such a response of the agent, the user can talk with the agent by replying on the basis of the user's own recognition. Then, by repeating such conversation with the agent a plurality of turns, the user can reduce the stress.

As described with reference to FIGS. **6** and **7**, in a case where the speech recognition system **11** collates the speech recognition result with the fact information such as the weather information and the accuracy of the information in the sentence representing the speech recognition result is low, the speech recognition system **11** can estimate the information as the correction portion and automatically correct and present the speech recognition result.

Next, processing of recognizing and automatically correcting an object located ahead of a line of sight of the user when performing translation using the speech recognition function provided by the speech recognition system **11** will be described with reference to FIGS. **8** and **9**.

For example, as illustrated in FIG. **8**, the user wears a pair of wearable goggles **61** incorporating the line-of-sight information acquisition unit **27** and the object recognition unit **28** illustrated in FIG. **2**. Then, the line-of-sight information acquisition unit **27** recognizes the line of sight of the user as illustrated as the arrow of one-dot chain line in FIG. **8**, and the object recognition unit **28** can perform object recognition for the object visually recognized by the user.

The example in FIG. **8** illustrates a state in which a child carries a pink ball **62** and a blue ball **63** in both hands and the line of sight of the user is heading toward the blue ball **63**. Therefore, the object recognition unit **28** superimposes and displays a user interface (pupil mark) indicating a result of the recognition of the line of sight of the user on the blue ball, and the object recognition result being the blue ball (Ball: Blue) is displayed.

In such a situation, as illustrated in FIG. **9**, it is assumed that the user utters "please pass the green ball" to the client terminal **13**.

First, in the client terminal **13**, the speech information acquisition unit **21** acquires the speech information based on the utterance of the user, and the communication unit **30** transmits the speech information to the speech recognition server **14**.

Then, in the speech recognition server **14**, the speech recognition unit **43** performs speech recognition for the speech information to acquire the speech recognition result "Please pass the green ball". Then, the correction portion estimation processing unit **46** recognizes that the object recognition information is necessary as the collation information for determining the accuracy of the content (object) of the sentence indicated by such a speech recognition result. In response to the recognition, the collation information acquisition unit **47** transmits, to the client terminal **13**, information requesting the object recognition information of when the utterance of the user has been made as the collation information.

In the client terminal **13**, according to the information requesting the object recognition information of the user as the collation information, the communication unit **30** reads out information according to the request from among various information recorded in the recording unit **29** and transmits the read information to the speech recognition server **14** as the collation information.

In response to the transmission, in the speech recognition server **14**, the collation information acquisition unit **47** acquires the object recognition information transmitted from the client terminal **13** and supplies the object recognition information to the correction portion estimation processing unit **46**. The correction portion estimation processing unit **46** collates the content of the sentence indicated by the speech recognition result with the object recognition information and estimates, for the sentence, whether or not there is a correction portion that requires correction. For example, in a case where the object indicated by the speech recognition result does not match the object indicated in the object recognition information, the correction portion estimation processing unit **46** can estimate the object indicated by the speech recognition result as the correction portion.

In the example illustrated in FIG. **9**, the correction portion estimation processing unit **46** collates the object "green ball" indicated by the speech recognition result with the object recognition information "blue ball (Ball: Blue)" as described with reference to FIG. **8**. As a result, since the object "green ball" indicated by the speech recognition result does not match the object recognition information "blue ball (Ball: Blue)", the correction portion estimation processing unit **46** estimates the object "green ball" indicated by the speech recognition result as the correction portion.

The correction portion estimation processing unit **46** adds the information for confirming the correction portion to the speech recognition result on the basis of the estimation and transmits the speech recognition result to the client terminal **13**. Therefore, the client terminal **13** can display the user interface for confirming the word estimated as the correction portion together with the sentence indicating the speech recognition result according to the information for confirming the correction portion.

In the example illustrated in FIG. **9**, the color "green" of the object estimated as the correction portion in the speech recognition result is automatically corrected to the color "blue", and a user interface for confirming whether or not the correction is correct "Here has been automatically corrected" is displayed. Furthermore, a GUI (good button/return to original information (green) button) for inputting a confirmation result by the user is displayed on the user interface. Moreover, a translation result "Please pass blue balls" of translation using the speech recognition result is displayed.

In a case where the user thinks that the color "blue" of the object indicated by the automatically corrected speech recognition result is correct, the user performs a touch operation on the good button on the user interface. As a result, the color "blue" of the object indicated by the speech recognition result is determined. On the other hand, in a case where the user thinks that the color "blue" of the object indicated by the automatically corrected speech recognition result is incorrect, the user performs a touch operation on the return to original information (green) button on the user interface. In this case, the color "blue" of the object indicated by the automatically corrected speech recognition result is corrected to "green".

As described with reference to FIGS. **8** and **9**, in a case where the speech recognition system **11** collates the speech recognition result with the object recognition information recorded in the client terminal **13** and the accuracy of the information in the sentence representing the speech recognition result is low, the speech recognition system **11** can estimate the information as the correction portion and automatically correct and present the speech recognition result.

<Example of User Interface Accepting Editing of Speech Recognition Result>

A user interface for editing the speech recognition result based on the speech recognition processing by the speech recognition system **11** will be described with reference to FIGS. **10** to **13**.

For example, as illustrated in FIG. **10**, in the client terminal **13**, the speech information acquisition unit **21** acquires the speech information of the illustrated waveform according to the utterance of the user "I drove your car to airport every day". Then, in the speech recognition server **14**, the speech recognition unit **43** executes the speech recognition processing on the basis of the speech information, acquires a sentence (character information) containing a word string recognized as a speech recognition result, and specifies correspondence between each word and phoneme information obtained from the speech information. Moreover, in the speech recognition server **14**, the natural language processing unit **44** specifies a part of speech of each word of the speech recognition result and acquires part of speech information. Here, in the speech recognition server **14**, the speech information, the correspondence between the words and the phoneme information, and the part of speech information are temporarily stored.

Then, in a case where there is no correction portion as a result of the correction portion estimation processing unit **46** estimating the correction portion as described above, the speech recognition result "I drove your car to airport every day" is displayed on the video output unit **22** of the client terminal **13**.

By the way, even when the utterance of the user matches the speech recognition result, the user may wish to edit uttered content.

For example, as illustrated in FIG. **11**, in a case where the user wishes to edit the word "airport" displayed on the video output unit **22** to the word "station", the user long presses the portion where the word "airport" that the user wishes to edit is displayed. In response to the operation, the operation input unit **23** supplies the operation information indicating the content of the operation to the speech recognition result corresponding processing unit **31**, and the speech recognition result corresponding processing unit **31** specifies the word "airport" displayed on the video output unit **22** as the object to be edited. Then, the speech recognition result corresponding processing unit **31** can display the user interface for editing the speech recognition result.

In the example illustrated in FIG. **11**, a user interface for confirming deletion of the word "is this deleted?" is displayed for the word "airport" specified as the object to be edited. Furthermore, a GUI (OK button/NG button) for inputting a confirmation result by the user is displayed on the user interface.

In a case where the user agrees to the deletion of the word "airport" specified as the object to be edited, the user performs the touch operation on the OK button on the user interface. In response to the operation, the speech recognition result corresponding processing unit **31** transmits information indicating deletion of the word "airport" specified as the object to be edited to the speech recognition server **14**.

In response to the transmission, in the speech recognition server **14**, the editing corresponding processing unit **48** deletes the phoneme information associated with the word "airport" from the speech information based on the utterance of the user "I drove your car to airport every day". Therefore, the speech information stored in the speech recognition server **14** is configured by only the phoneme information corresponding to the words other than the word to be edited (hereinafter the phoneme information is appropriately referred to as speech information of non-editing object), as illustrated in FIG. **11**.

Note that, for example, the word to be the object to be edited may be specified according to utterance of the user "delete airport and input station", other than the example illustrated in FIG. **11**. Furthermore, for example, in a case where a time in which the user stops the line of sight on a word that the user wishes to edit is a predetermined time (for example, three seconds) or more, the word may be specified as the object to be edited. Even in these cases, a user interface similar to the user interface in FIG. **11** is displayed, and the word to be edited can be deleted according to the touch operation of the user on the user interface.

Meanwhile, as illustrated in FIG. **12**, in the client terminal **13**, the speech recognition result corresponding processing unit **31** causes the video output unit **22** to display the user interface prompting re-utterance. On this user interface, a word string with a blank portion where the word to be edited has been deleted from the speech recognition result is displayed and a message prompting re-utterance for editing the word in the blank portion "Waiting for re-utterance to here" is displayed.

In response to such a user interface, the speech information acquisition unit **21** acquires the speech information of the re-utterance based on the utterance "station" of the user and transmits the speech information to the speech recognition server **14**. In the speech recognition server **14**, the editing corresponding processing unit **48** performs processing of connecting the speech information "station" of the re-utterance to the portion where the phoneme information associated with the word "airport" in the speech information of non-editing object is deleted to create the speech information for editing speech recognition.

Then, the editing corresponding processing unit **48** supplies the speech information for editing speech recognition to the speech recognition unit **43** to perform speech recognition. As a result, the speech recognition unit **43** acquires the speech recognition result "I drove your car to station every day" and supplies the speech recognition result to the editing corresponding processing unit **48**. The editing corresponding processing unit **48** deletes the speech information of non-editing object from the speech recognition result, acquires the word "station" to be the replacement information to be replaced with the word "airport" deleted from the speech recognition result presented to the user, and transmits the replacement information to the client terminal **13**.

In response to the transmission, as illustrated in FIG. **13**, in the client terminal **13**, the speech recognition result corresponding processing unit **31** displays the speech recognition result "I drove your car to station every day" reflecting the editing with the word "station" that is the replacement information. Moreover, the speech recognition result corresponding processing unit **31** displays a user interface "Is this possibly . . . ?" that presents other candidates of the replacement information. On this user interface, a GUI for inputting other candidates (stay and attention) and a GUI (leave it button) instructing determination of the editing with the word "station" that is the replacement information are displayed in addition to the replacement information.

In the case of determining the editing with the word "station" that is the replacement information, the touch operation on the leave it button is performed on the user interface. In response to the operation, the speech recognition result corresponding processing unit **31** can determine the speech recognition result "I drove your car to station every day" reflecting the editing with the word "station" that is the replacement information. Note that the editing with the word "station" that is the replacement information may be determined by a speech (utterance of "leave it") or a line of sight, other than the above operation.

Note that at least one piece of speech information for editing speech recognition is created. For example, a plurality of pieces of the speech information for editing speech recognition may be created in some patterns. Furthermore, one piece of speech information of the re-utterance has been described. However, a plurality of pieces of speech information may be adopted. In this case, pieces of the speech information for editing speech recognition in some patters are created.

For example, to increase the precision of the speech recognition, the editing corresponding processing unit **48** can add specific speech information to before a portion to which the speech information of the re-utterance is connected to create the speech information for editing speech recognition.

For example, as illustrated in FIG. **14**, the editing corresponding processing unit **48** may perform processing of adding speech information "new" to before the portion to which the speech information of the re-utterance is connected, and connecting the speech information "station" of the re-utterance following the speech information "new", thereby creating the speech information for editing speech recognition. For example, since there is a high possibility that a noun enters the deleted portion because the part of speech of the word "airport" recognized in preliminary language processing is a noun, the editing corresponding processing unit **48** adds the speech information "new". Furthermore, the editing corresponding processing unit **48** can add speech information stored when the user uttered in the past, can link and add speech information acquirable via the network **12**, and can add speech information created with a synthesized speech (TSS), as the speech information "new".

Then, by adding the speech information "new" to before the portion to which the speech information of the re-utterance is connected, the precision of recognizing the speech information of the re-utterance can be improved when the speech recognition unit **43** performs speech recognition for the speech information for editing speech recognition.

<Speech Information for Editing Speech Recognition Using Sound Information Other Than Utterance>

An example of using sound information other than utterance, as the speech information for editing speech recognition, for performing the speech recognition processing for the speech information of the re-utterance, will be described with reference to FIGS. **15**, **16**, **17**A, and **17**B.

As illustrated in FIG. **15**, for example, the user utters "The apple bought today is very tasty" to the client terminal **13**, and a speech recognition result of the utterance is displayed on the video output unit **22** of the client terminal **13**.

In a case where the user wishes to edit the word "apple" displayed on the video output unit **22** to a word "peach" in such a speech recognition result, the user long presses the portion where the word "apple" that the user wishes to edit is displayed. As a result, the speech recognition result corresponding processing unit **31** specifies the word as the object to be edited.

Then, the speech recognition result corresponding processing unit **31** displays a user interface for confirming deletion of the word "Is this deleted?" for the word "apple" specified as the object to be edited. Furthermore, a GUI (OK button/NG button) for inputting a confirmation result by the user is displayed on the user interface.

In a case where the user agrees to the deletion of the word "apple" specified as the object to be deleted with respect to such a user interface, the user performs the touch operation on the OK button and re-utters "peach". In response to the operation, the speech information acquisition unit **21** acquires speech information of re-utterance based on the re-utterance "peach" of the user, and transmits the speech information to the speech recognition server **14**.

At this time, as illustrated in FIG. **16**, the editing corresponding processing unit **48** generates the speech information for editing speech recognition by reference to a database in which a part of speech and categories are associated with each other and a database in which categories, attachable information, and formats of sentence are associated with one another.

Then, in a case where the re-utterance "peach" of the user is associated with a category "fruit name", the editing corresponding processing unit **48** can generate a character string according to attachable information "sweet" to the category "fruit name" as the speech information for editing speech recognition. For example, the editing corresponding processing unit **48** generates a character string "sweet peach bought today is very tasty" as illustrated in FIG. **17**A. In such a character string, the speech information uttered by the user is used for "bought today" and "is very tasty", "sweet" is output by synthesized speech (TSS), and the speech information of the re-utterance of the user is used for "peach".

Furthermore, the editing corresponding processing unit **48** can generate a character string according to a format "tasty fruit+is +(target characters)" of a sentence associated with the category "fruit name" of the re-utterance "peach" of the user, as the speech information for editing speech recognition. For example, the editing corresponding processing unit **48** generates a character string of character string character string "tasty fruit is peach", as illustrated in FIG. **17**B. In such a character string, "tasty fruit" and "is" are output by synthesized speech (TSS), and the speech information of the re-utterance of the user is used for "peach".

In this manner, the editing corresponding processing unit **48** can generate the speech information for editing speech recognition using the synthesized speech (TSS) as the speech information other than utterance and perform the speech recognition for the speech information of the re-utterance. As a result, for example, the editing corresponding processing unit **48** can increase the precision of the speech recognition as compared with speech recognition for the speech information alone of the re-utterance.

In other words, the speech recognition system **11** can perform the speech recognition for the re-utterance with high precision by connecting the speech information of the re-utterance to the sound information other than the utterance as described above, the synthesized speech representing information attachable to a category, the synthesized speech representing a sentence generated from a format of sentence, or the like.

Moreover, the speech recognition system **11** can be applied to cases of performing various types of editing based on the re-utterance of the user, in addition to the editing of replacing the word on the basis of the re-utterance of the user (editing airport to station), as described above.

For example, as illustrated in FIG. **18**, the speech recognition system **11** can edit conjugation of a verb (edit like to liked) or can edit change of a noun (edit cars to car) on the basis of the re-utterance of the user. Furthermore, the speech recognition system **11** can edit a mistake due to similar sound (edit He to She) on the basis of the re-utterance of the user. Furthermore, the speech recognition system **11** can edit recognition failure in units of words and phrases (edit had to would like) on the basis of the re-utterance of the user.

Then, the speech recognition system **11** connects the speech information other than the speech information of the re-utterance to the speech information of the re-utterance by the user, thereby performing the speech recognition for the re-utterance with high precision.

For example, in a case of performing the speech recognition using only the speech information of the re-utterance when editing the mistake due to similar sound (for example, editing He to She), failure of the sound recognition (for example, false recognition as C or See) is expected. To deal with the failure, the speech recognition system **11** connects the speech information of the re-utterance to the sound information other than utterance and performs the speech recognition for the entire speech information, thereby avoiding such failure of the speech recognition.

Note that, as another example of editing the mistake due to similar sound, the speech recognition system **11** can edit the mistake on the basis of the re-utterance of the user when obtaining a speech recognition result "I want to go to a hospital to die" to an utterance of the user "I want to go to a hospital to day" (edit die to day).

By the way, there are some cases where the speech recognition result falls short of expectations no matter how high the precision of the speech recognition technology is. For example, human memory is not perfect, so even if the speech recognition succeeds, a speech recognition result containing a mistake is not a desired result, due to an utterance with the mistake. Furthermore, it is assumed that humans cannot notice the mistake of content even if the speech recognition result containing the mistake is presented.

To deal with the mistake, the speech recognition system **11** collates the result with the action information, the weather information, and the like to estimate the correction portion for the utterance containing the mistake, and presents the correction portion, thereby enabling the user to easily notice the mistake. As a result, the speech recognition system **11** can improve the precision of the speech correction system.

Moreover, when making re-utterance and reflecting editing on a part of a character string obtained as a result of a speech input as the editing portion, the recognition precision becomes low and expected correction cannot be performed if utterance context contained in the original utterance cannot be used even if the speech recognition is performed only for the portion of the re-utterance.

To deal with the above, the speech recognition system **11** connects the speech information other than the speech information of the re-utterance to the speech information of the re-utterance, thereby performing the speech recognition for the re-utterance with high precision, using the utterance context contained in the original utterance.

<Processing in Client Terminal>

FIG. **19** is a flowchart for describing processing executed in a client terminal **13**.

For example, the client terminal **13** always performs processing in the background even when the user is not inputting speech. In step S**11**, the action information acquisition unit **25** acquires the action information of the user and records the action information in the recording unit **29**.

In step S**12**, the environment information acquisition unit **26** acquires the environment information indicating the environment around the user and records the environment information in the recording unit **29**.

In step S**13**, the line-of-sight information acquisition unit **27** acquires the line-of-sight information indicating the direction of the line of sight of the user, and the object recognition unit **28** acquires the object recognition information indicating the recognition result of the object visually recognized by the user. Then, the line-of-sight information and the object recognition information are recorded in the recording unit **29** as user sensing information obtained as a result of sensing the user.

In step S**14**, the speech information acquisition unit **21** determines whether or not speech input by the user has been started. For example, when a specific operation is performed for a button (not illustrated) or when a user utters a specific keyword instructing the start of speech input, the speech information acquisition unit **21** can determine that the speech input by the user has been started.

In step S**14**, in a case where the speech information acquisition unit **21** determines that the speech input by the user has not been started, the processing returns to step S**11** and the above-described processing is repeatedly performed. On the other hand, in step S**14**, in a case where the speech information acquisition unit **21** determines that the speech input has been started, the processing proceeds to step S**15**.

In step S**15**, the speech information acquisition unit **21** acquires the speech information based on the utterance of the user. Then, the speech information acquisition unit **21** supplies the speech information to the communication unit **30**, and the communication unit **30** transmits the speech information to the speech recognition server **14** via the network **12**.

In step S**16**, the communication unit **30** transmits the collation information according to the request (for example, step S**35** in FIG. **20** as described below) by the collation information acquisition unit **47** of the speech recognition server **14** to the speech recognition server **14** via the network **12**. As described above, the action information, the environment information, and the user sensing information are recorded in the recording unit **29**, and the communication unit **30** reads information according to the request by the collation information acquisition unit **47** from among the information and transmits the read information to the speech recognition server **14** as the collation information.

In step S**17**, the communication unit **30** acquires the speech recognition result transmitted from the speech recognition server **14** in step S**39** or S**39** in FIG. **20** as described below and supplies the speech recognition result to the speech recognition result corresponding processing unit **31**. Here, in the case where it has been estimated that there is a correction portion that requires correction for the speech recognition result in the speech recognition server **14**, the information for confirming the correction portion is added to the speech recognition result.

In step S**18**, the speech recognition result corresponding processing unit **31** determines whether or not it has been estimated that there is a correction portion for the speech recognition result on the basis of whether or not the information for confirming the correction portion is added to the speech recognition result.

In step S**18**, in a case where the speech recognition result corresponding processing unit **31** determines that it has been estimated that there is a correction portion for the speech recognition result, the processing proceeds to step S**19**.

In step S**19**, the speech recognition result corresponding processing unit **31** causes the video output unit **22** to display the sentence indicating the speech recognition result and generates the user interface for confirming the correction portion and causes the video output unit **22** to display the user interface. In this user interface, a GUI (button) for accepting confirmation of correction by the user is displayed, as described with reference to FIGS. **4** to **9**.

In step S**20**, the operation input unit **23** supplies, to the speech recognition result corresponding processing unit **31**, the operation information indicating the content of the operation input by the touch operation of the user on the GUI for accepting confirmation of correction by the user. Then, the speech recognition result corresponding processing unit **31** causes the video output unit **22** to display the speech recognition result reflecting the confirmation result for the correction portion according to the operation information.

On the other hand, in step S**18**, in a case where the speech recognition result corresponding processing unit **31** determines that it has not been estimated that there is a correction portion for the speech recognition result, the processing proceeds to step S**21**, and the speech recognition result corresponding processing unit **31** causes the video output unit **22** to display the sentence indicating the speech recognition result.

After the processing of step S**20** or S**21**, the processing proceeds to step S**22**, and the speech recognition result corresponding processing unit **31** determines whether or not the user has instructed editing of the uttered content to the speech recognition result displayed on the video output unit **22**. For example, as described with reference to FIG. **11**, when the user touches and long presses a portion where a word to be edited is displayed in the sentence indicated by the speech recognition result and the operation information corresponding to the touch operation is supplied from the operation input unit **23**, the speech recognition result corresponding processing unit **31** can determine that editing of the uttered content has been instructed by the user.

In step S**22**, in a case where the speech recognition result corresponding processing unit **31** determines that the editing of the uttered content has been instructed by the user, the processing proceeds to step S**23**.

In step S**23**, the speech recognition result corresponding processing unit **31** specifies the editing portion based on the operation information, in other words, the word to be the object to be edited. Then, the speech recognition result corresponding processing unit **31** displays the user interface for confirming deletion of the word, as described with reference to FIG. **11**. Thereafter, when the user performs the operation of agreeing to the deletion of the word specified as the object to be edited, the speech recognition result corresponding processing unit **31** transmits information indicating the deletion of the word specified as the object to be edited to the speech recognition server **14**.

In step S**24**, the speech recognition result corresponding processing unit **31** causes the video output unit **22** to display the user interface prompting re-utterance, as described with reference to FIG. **12**. Then, the speech information acquisition unit **21** acquires the speech information of re-utterance based on the utterance of the user, and transmits the speech information to the speech recognition server **14**.

In step S**25**, the speech recognition result corresponding processing unit **31** acquires the replacement information transmitted from the speech recognition server **14** in step S**56** in FIG. **21** as described below via the communication unit **30**. Then, the speech recognition result corresponding processing unit **31** replaces the editing portion with the replacement information and causes the video output unit **22** to display the speech recognition result reflecting the editing.

After the processing in step S**25** or in a case where it is determined that editing of the uttered content has not been instructed by the user in step S**22**, the processing returns to step S**11**, and hereinafter similar processing is repeated performed.

<Processing in Speech Recognition Server>

FIGS. **20** and **21** are flowcharts for describing processing executed in the speech recognition server **14**.

For example, when the communication unit **41** receives the speech information transmitted from the client terminal **13** in step S**15** in FIG. **19** and supplies the speech information to the input sound processing unit **42**, the processing is started. In step S**31**, the input sound processing unit **42** performs the preprocessing such as VAD processing for the speech information supplied from the communication unit **41** and supplies the speech information to the speech recognition unit **43**.

In step S**32**, the speech recognition unit **43** performs the speech recognition processing for the speech information supplied from the input sound processing unit **42** in step S**31**. Then, the speech recognition unit **43** supplies the sentence obtained as the speech recognition result to the natural language processing unit **44**.

In step S**33**, the natural language processing unit **44** performs the natural language processing for the sentence representing the speech recognition result supplied from the speech recognition unit **43** in step S**32** and supplies the speech recognition result to which the natural language processing has been applied to the semantic analysis processing unit **45**.

In step S**34**, the semantic analysis processing unit **45** performs the semantic analysis processing of analyzing the meaning of the sentence for the sentence representing the speech recognition result supplied from the natural language processing unit **44** in step S**33** and supplies content of the sentence indicated by the speech recognition result to the correction portion estimation processing unit **46**.

In step S**35**, the correction portion estimation processing unit **46** recognizes the collation information necessary for determining the accuracy of the content of the sentence indicated by the speech recognition result supplied from the semantic analysis processing unit **45** in step S**34**, and the collation information acquisition unit **47** requests the collation information via the communication unit **41**. For example, the collation information acquisition unit **47** requests the client terminal **13** to transmit the action information, the environment information, the line-of-sight information, the object recognition information, and the like or requests the news server **15** and the encyclopedia server **16** to transmit the fact information. Then, the collation information acquisition unit **47** acquires the collation information transmitted in response to the request via the communication unit **41** and supplies the collation information to the correction portion estimation processing unit **46**.

In step S**36**, the correction portion estimation processing unit **46** performs processing collating the content of the sentence indicated by the speech recognition result with the collation information acquired in step S**35** and estimating a correction portion for the sentence.

In step S**37**, the correction portion estimation processing unit **46** determines whether or not it has been estimated that there is a correction portion in the sentence indicated by the speech recognition result as a result of the processing in step S35.

In step S37, in a case where the correction portion estimation processing unit **46** determines that there is a correction portion in the sentence indicated by the speech recognition result, the processing proceeds to step S**38**. In step S**38**, the correction portion estimation processing unit **46** supplies information indicating the correction portion together with the speech recognition result to the speech recognition result output processing unit **49**, and the speech recognition result output processing unit **49** outputs the information for confirming the correction portion together with the speech recognition result.

On the other hand, in step S37, in a case where the correction portion estimation processing unit **46** determines that there is no correction portion in the sentence indicated by the speech recognition result, the processing proceeds to step S**39**. In step S**39**, the correction portion estimation processing unit **46** supplies the speech recognition result to the speech recognition result output processing unit **49**, and the speech recognition result output processing unit **49** outputs the speech recognition result.

After the processing in step S**38** or S**39**, the processing proceeds to step S**40**, and the editing corresponding processing unit **48** determines whether or not the editing portion has been notified by the client terminal **13**. For example, when the information indicating deletion of the word specified as the object to be deleted is transmitted from the client terminal **13** in step S**23** in FIG. **19**, the editing corresponding processing unit **48** determines that the editing portion has been notified.

In step S**40**, in a case where the editing corresponding processing unit **48** determines that the editing portion has been notified, the processing proceeds to step S**41** and is terminated after editing corresponding processing is performed. In a case where the editing corresponding processing unit **48** determines that the editing portion has not been notified, the processing is directly terminated.

FIG. **21** is a flowchart for describing the editing corresponding processing performed in step S**41** in FIG. **20**.

In step S**51**, the editing corresponding processing unit **48** recognizes the editing portion according to the information indicating deletion of the word specified as the object to be deleted transmitted from the client terminal **13**.

In step S**52**, the editing corresponding processing unit **48** deletes the phoneme information associated with the word of the editing portion recognized in step S51 from the speech information stored in the speech recognition server **14**, as described with reference to FIG. **11**. As a result, the editing corresponding processing unit **48** specifies the speech information of non-editing object.

In step S53, the editing corresponding processing unit **48** acquires the speech information of the re-utterance transmitted from the client terminal **13** in step S24 of in FIG. **19**.

In step S54, the editing corresponding processing unit **48** performs processing of connecting the speech information of the re-utterance acquired in step S53 to the editing portion from which the word has been deleted in the speech information of non-editing object recognized in step S52, thereby creating the speech information for editing speech recognition.

In step S55, the editing corresponding processing unit **48** supplies the speech information for editing speech recognition created in step S54 to the speech recognition unit **43** to perform speech recognition.

In step S56, the editing corresponding processing unit **48** determines the speech information remaining after deleting the speech information of non-editing object, from the speech recognition result obtained by performing the speech recognition in step S55, as the replacement information to be replaced with the editing portion. Then, the editing corresponding processing unit **48** transmits the replacement information to the client terminal **13** via the communication unit **41**. In response to the transmission, after editing is reflected by replacing the editing portion of the speech recognition result with the replacement information in step S25 in FIG. **19**, the editing corresponding processing is terminated.

As described above, the client terminal **13** and the speech recognition server **14** can display the user interface for confirming the correction portion estimated on the basis of the action information of the user, the weather information, and the like, together with the speech recognition result for the speech information based on the utterance of the user. With the display, an incorrect speech input due to slip of memory of the user or the like can be easily corrected, for example.

Furthermore, the client terminal **13** and the speech recognition server **14** can perform the speech recognition for the speech information for editing speech recognition in which the speech information of the re-utterance of the editing portion instructed by the user is connected to the speech information of non-editing object. Therefore, the speech recognition server **14** can further improve the precision of the speech recognition than a configuration that performs the speech recognition using only the speech information of re-utterance, for example.

As described above, the speech recognition system **11** can estimate the correction portion with more accuracy and present the correction portion to the user, and can perform the speech recognition for the editing portion with high precision. As a result, the speech recognition system **11** can provide a more convenient speech recognition service.

Therefore, the speech recognition service provided by the speech recognition system **11** can be used in applications in general that provides a user interface for inputting speech, for example. For example, by using a speech recognition service provided by the speech recognition system **11** in a virtual agent system or the like, a lie can be estimated as the correction portion in a case where an utterance of a user contains the lie, and the user can be prompted to correct the correction portion.

For example, when the user utters “Today is cold”, the speech recognition system **11** collates the utterance with the environment information indicating temperature acquired by the environment information acquisition unit **26** and can estimate the word “cold” of the speech recognition result as the correction portion in a case where the temperature at that time is 38 degrees.

Note that, in the present embodiment, the speech recognition system **11** is configured by the client terminal **13** and the speech recognition server **14** connected via the network **12**, and provides the speech recognition server as described with reference to FIG. **1**. However, the embodiment is not limited to this configuration, and for example, the client terminal **13** alone may configure a speech recognition system and provide a speech recognition service without performing communication via the network **12**.

Furthermore, the blocks constituting the client terminal **13** and the speech recognition server **14** may be arranged on either side of the network **12** as long as the blocks can provide the speech recognition service as the speech recognition system **11** on the whole.

Note that the processing described with reference to the flowcharts need not necessarily be chronologically processed according to the order described as the flowcharts and includes processing executed in parallel or individually (for example, parallel processing and processing by object) Furthermore, the program may be processed by a single CPU or may be processed in a distributed manner by a plurality of CPUs.

Furthermore, the above-described series of processing (information processing method) can be executed by hardware or software. In the case of executing the series of processing by software, a program constituting the software is installed from a program recording medium on which the program is recorded to a computer incorporated in dedicated hardware, or for example, a general-purpose computer capable of executing various functions by being installed various programs, or the like.

FIG. **22** is a block diagram illustrating a configuration example of hardware of a computer that executes the above-described series of processing by a program.

In the computer, a central processing unit (CPU) **101**, a read only memory (ROM) **102**, and a random access memory (RAM) **103** are mutually connected by a bus **104**.

Moreover, an input/output interface **105** is connected to the bus **104**. An input unit **106** including a keyboard, a mouse, a microphone, and the like, an output unit **107** including a display, a speaker, and the like, a storage unit **108** including a hard disk, a non-volatile memory, and the like, a communication unit **109** including a network interface and the like, and a drive **110** for driving a removable medium **111** such as a magnetic disk, an optical disk, a magneto-optical disk, or a semiconductor memory are connected to the input/output interface **105**.

In the computer configured as described above, the CPU **101** loads a program stored in the storage unit **108** into the RAM **103** and executes the program via the input/output interface **105** and the bus **104**, whereby the above-described series of processing is performed, for example.

The program executed by the computer (CPU **101**) is provided by, for example, being recorded on the removable medium **111** that is a package medium including a magnetic disk (including a flexible disk), an optical disk (a compact disc-read only memory (CD-ROM), a digital versatile disc (DVD), or the like), or via a wired or wireless transmission medium such as a local area network, the Internet, or digital satellite broadcasting.

Then, the program can be installed to the storage unit **108** via the input/output user interface **105** by attaching the removal medium **111** to the drive **110**. Furthermore, the program can be received by the communication unit **109** via a wired or wireless transmission medium and installed in the storage unit **108**. Other than the above method, the program can be installed in the ROM **102** or the storage unit **108** in advance.

Note that the present technology can also have the following configurations.

(1)

An information processing apparatus including:

a speech recognition unit configured to perform speech recognition for speech information based on an utterance of a user;

a correction portion estimation unit configured to collate content of a sentence obtained as a speech recognition result by the speech recognition unit with collation information necessary for determining accuracy of the content to estimate, for the sentence, a correction portion that requires correction; and

a presenting unit configured to present, to the user, the sentence obtained as the speech recognition result together with the correction portion estimated by the correction portion estimation unit.

(2)

The information processing apparatus according to (1), further including:

a collation information acquisition unit configured to acquire the collation information required by the correction portion estimation unit and supplies the collation information to the correction portion estimation unit.

(3)

The information processing apparatus according to (2), in which

the collation information acquisition unit acquires fact information provided via a network as the collation information, and

the correction portion estimation unit collates the content of the sentence with the fact information to estimate the correction portion.

(4)

The information processing apparatus according to (2) or (3), in which

the collation information acquisition unit acquires action information acquired with an action of the user as the collation information, and

the correction portion estimation unit collates the content of the sentence with the action information to estimate the correction portion.

(5)

The information processing apparatus according to any one of (2) to (4), in which

the collation information acquisition unit acquires environment information indicating an environment around the user as the collation information, and

the correction portion estimation unit collates the content of the sentence with the environment information to estimate the correction portion.

(6)

The information processing apparatus according to any one of (2) to (5), in which

the collation information acquisition unit acquires object recognition information obtained by recognizing an object located ahead of a line of sight of the user as the collation information, and

the correction portion estimation unit collates the content of the sentence with the object recognition information to estimate the correction portion.

(7)

The information processing apparatus according to any one of (1) to (6), further including:

a corresponding processing unit configured to perform processing corresponding to an instruction of the user with respect to presentation of the correction portion.

(8)

An information processing method including the steps of:

performing speech recognition for speech information based on an utterance of a user;

collating content of a sentence obtained as a speech recognition result with collation information necessary for determining accuracy of the content to estimate, for the sentence, a correction portion that requires correction; and

presenting, to the user, the sentence obtained as the speech recognition result together with the estimated correction portion.

(9)

A program for causing a computer to execute information processing including steps of:

performing speech recognition for speech information based on an utterance of a user;

collating content of a sentence obtained as a speech recognition result with collation information necessary for determining accuracy of the content to estimate, for the sentence, a correction portion that requires correction; and

presenting, to the user, the sentence obtained as the speech recognition result together with the estimated correction portion.

Note that the present embodiments are not limited to the above-described embodiments, and various modifications can be made without departing from the gist of the present disclosure.

REFERENCE SIGNS LIST

11	Speech recognition system
12	Network
13	Client terminal
14	Speech recognition server
15	News server
16	Encyclopedia server
21	Speech information acquisition unit
22	Video output unit
23	Operation input unit
24	Speech output unit
25	Action information acquisition unit
26	Environment information acquisition section
27	Line-of-sight information acquisition unit
28	Object recognition unit
29	Recording unit
30	Communication unit
31	Speech recognition result corresponding processing unit
41	Communication unit
42	Input sound processing unit
43	Speech recognition unit
44	Natural language processing unit
45	Semantic analysis processing unit
46	Correction portion estimation processing unit
47	Collation information acquisition unit
48	Editing corresponding processing unit
49	Speech recognition result output processing unit

The invention claimed is:

1. An information processing apparatus, comprising:

circuitry configured to:

perform a speech recognition process for speech information based on an utterance of a user;

obtain, as a speech recognition result, a sentence based on the speech recognition process;

acquire, as collation information, environment information that indicates an environment around the user, wherein the environment information includes at least one of a temperature associated with the environment or a humidity associated with the environment;

collate a content of the sentence with the environment information;

estimate, for the sentence, a correction portion based on the collation of the content of the sentence with the environment information, wherein the correction portion corresponds to a portion of the sentence that requires a correction; and

present, to the user, the sentence and the correction portion.

2. The information processing apparatus according to claim **1**, wherein the circuitry is further configured to acquire the collation information from a device associated with user.

3. The information processing apparatus according to claim **2**, wherein the circuitry is further configured to:

acquire fact information via a network as the collation information;

collate the content of the sentence with the fact information; and

estimate the correction portion based on the collation of the content of the sentence with the fact information.

4. The information processing apparatus according to claim **2**, wherein the circuitry is further configured to:

acquire, as the collation information, action information corresponding to an action of the user;

collate the content of the sentence with the action information; and

estimate the correction portion based on the collation of the content of the sentence with the action information.

5. The information processing apparatus according to claim **2**, wherein the circuitry is further configured to:

recognize an object that is ahead of a line of sight of the user;

acquire, as the collation information, object recognition information based on the recognized object;

collate the content of the sentence with the object recognition information; and

estimate the correction portion based on the collation of the content of the sentence with the object recognition information.

6. The information processing apparatus according to claim **1**, wherein the circuitry is further configured to perform a process corresponding to an instruction of the user with respect to the presentation of the correction portion.

7. An information processing method, comprising:

performing a speech recognition process for speech information based on an utterance of a user;

obtaining, as a speech recognition result, a sentence based on the speech recognition process;

acquiring, as collation information, environment information indicating an environment around the user, wherein the environment information includes at least one of a temperature associated with the environment or a humidity associated with the environment;

collating a content of the sentence with the environment information;

estimating, for the sentence, a correction portion based on the collation of the content of the sentence with the environment information, wherein the correction portion corresponds to a portion of the sentence that requires a correction; and

presenting, to the user, the sentence and the estimated correction portion.

8. A non-transitory computer-readable medium having stored thereon computer-executable instructions which, when executed by circuitry of an information processing apparatus, cause the circuitry to execute operations, the operations comprising:

performing a speech recognition process for speech information based on an utterance of a user;

obtaining, as a speech recognition result, a sentence based on the speech recognition process;

acquiring, as collation information, environment information indicating an environment around the user, wherein the environment information includes at least one of a temperature associated with the environment or a humidity associated with the environment;

collating a content of the sentence with the environment information;

estimating, for the sentence, a correction portion based on the collation of the content of the sentence with the environment information, wherein the correction portion corresponds to a portion of the sentence that requires a correction; and

presenting, to the user, the sentence and the estimated correction portion.

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